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The Editor
ComputerNews
University of Toronto Computing Services
4 Bancroft Avenue, Room 217
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Canada M5S 1A1

Network address:
phood@vm.utcs.utoronto.ca
(NetNorth/BITNET/EARN)

Unless otherwise indicated, network addresses appearing after the author's name pertain to NetNorth/BITNET/EARN.

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National Net '91 Conference Part 2:

The Human Genome Project

Glenn Britton
britton@utcs.utoronto.ca

In Part 1 of the National Net Conference Report (May/June 1991 ComputerNews), we examined several projects involved in the creation of digital libraries. In Part 2, we look at the collaborative technology in the Human Genome Project.

Computer Networking and the Human Genome Project

The Human Genome Project is an ambitious attempt to make a genetic map of the human body's chromosomes and genes. Universities in several countries are involved in this research, with the United States contributing the largest effort. In the words of Walter Panko, Director of Information Technology and Networking at the University of Michigan Medical Centre: "It is a massive reverse engineering project of an unprecedented scale and an interesting informatics problem."

The project began in 1990 and is expected to last 15 years. David Kingsbury, of the Department of Microbiology and Immunology at George Washington University and former NSFNet Associate Director, referred to the Human Genome Project as a "highly distributed cottage industry" as he discussed the largely unrecognized role of computer networking in the project. The project is not without controversy and critics, as some scientists question how useful a human genetic map would be to medicine and, consequently, whether the enormous costs of the Human Genome Project are justified.

How Can a Geneticist Use a Computer Network?

Genes are composed of DNA (deoxyribonucleic acid), which is a long molecule composed of bases represented by four letters: G, C, A, and T. DNA sequencing, in simplified terms, is the identification of long strings of these bases (for example, TCGCAATTC) and figuring out their location on a chromosome. One of the goals of the project is to determine the complete DNA sequence of the human genome, which has approximately three billion base pairs. (A genome is the set of chromosomes found in each nucleus of a given species.) The laboratory-intensive DNA sequencing could be aided by a computer network that would allow geneticists to share information and compare DNA sequences in the laboratory to those stored in genomic databases.

There are approximately 20 genomic databases throughout the world, including GENBANK and the Brookhaven Protein Databank in the United States, and the European Molecular Biology Laboratory in Belgium. These genomic databases are specialized in various ways. Some contain information about particular organisms, such as humans, mice, yeasts, and bacteria. Other databases are specialized by chromosomes and protein structures, and others are bibliographic and taxonomic. Currently these genomic databases store sequence information for about 30 million base pairs for humans and other organisms. This means that less than one percent of the human genome has been sequenced.

Geneticists in the United States who claim to have sequenced some new DNA for a given chromosome must first check GENBANK to see if the sequence already exists, and if the sequence is indeed new they are obliged to enter it into GENBANK. GENBANK currently is growing at the rate of approximately 100 base pairs per day.

Adding new sequence information to a genomic database poses some problems. To which database should you compare your laboratory DNA sequence? If your query to a database indicates that your DNA sequence is new, how do you know that it does not exist in one of the other 20 databases? From a researcher's perspective, this problem might be phrased “How do I perform a better search, one that searches many databases intelligently?”.

Problems inhibiting the use of a computer network to aid sequencing are a result of the lack of tools to process genetic data. Relational database theory is based on mathematical set theory. DNA sequences, however, are not sets, so database applications are not suited to DNA sequence comparison. Researchers are working on new algorithms known as “dynamic programming” and “approximate string matching” to overcome the lack of tools at hand for geneticists. Dr. Frank Olken, of the University of California at Berkeley Information and Computer Science Division, stressed the importance of these new algorithms in a seminar he presented at the University of Toronto: “Dynamic programming is to sequencing as sorting is to computer science.” Biology may once have been less mathematically oriented than physics, but this is changing. Kingsbury calls himself a computational biologist and jests that biologists once studied biology to avoid math. Panko estimates that 25% of modern biology did not exist 15 years ago, and refers to biology today as a “data driven science.”

The challenge, ultimately, is to develop a way of organizing this information to make it easily accessible to the biological community in general via a computer network. The goal at present is to establish a network that will allow real-time entry of new DNA sequences into an international database.

Summary

Projects such as digital libraries (discussed in the June 1991 issue of *ComputerNews*) and the Human Genome Project face similar problems and challenges when a computer network is used. One common element of the projects is large databases, spanning many countries, and stored in many forms. A second is the coordination of many countries and organizations with widely varying interests. Third is the profound effects of the enhanced abilities of this communications medium on how people work and the type of work they do.

Collaborative applications on computer networks will enhance the ability of people to communicate. We will be able to communicate a wider variety of material (text, high-resolution images) in greater magnitude, to and from more people and places, and do it at incredible speeds. The ability to share information globally is sure to facilitate research in many disciplines.

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Say it with Style!

in Word on the Mac

Maureen Monné
monne@vm.utcs.utoronto.ca

Those of us who graduated from the IBM Selectric School of Document Production remember well the days when document formatting involved tabbing, margin indents, capitalization, and little else. We changed typefaces by changing type balls, and then wiped the ink from our fingers, hoping we hadn't touched our noses first. We resigned ourselves to the grim reality that rearranging 15 paragraphs over 33 pages involved hours of retyping. Heaven help us if we left a letter out of Nietzsche in 17 places, and the pitch was too tight to allow for the insertion of one extra character.

Now that many of us have microcomputers on our desks, we have discovered that jobs that once exasperated us have become simple, almost enjoyable. Word-processing software provides the power to do many things, but you have to learn how to capitalize on this power and, occasionally, teach the program to take over repetitive tasks for you. One word-processing feature that is often overlooked is styles, a method of streamlining and controlling formatting using your own definitions.

Why Styles?

People in a variety of professions have a special way of organizing what they do. Builders use blueprints. Tailors use patterns. Disc jockeys use play lists. They all work from a plan.

The plan we use in word-processing programs is called a "style sheet." It can help to make your work easier, faster, and more consistent. Simply stated, a style sheet is a collection of character and paragraph formatting definitions that you use to control the appearance of a selected paragraph or paragraphs. These definitions can include combinations of typeface, type size, type style, paragraph alignment, tab settings, line and paragraph spacing—the possible mixtures are virtually endless. The entire collection is the style sheet; each item therein is a "style."

Styles are particularly well suited to the production of long or complex documents. You can format 60 pages of text in an annual report, for example, using only two steps per paragraph as opposed to five or more (see chart below).

If your document requires a variety of formatting, you can run into difficulty keeping track of the specific combinations that apply to certain types of paragraphs. Does the subtitle require 12 point or 14 point type? Does the quotation have one-inch indents or 3/4-inch indents? It is also easy to go through five steps of applying formatting to a paragraph, realize that you are applying the wrong ones, and then have to start again.

Certain companies and offices have developed formatting standards that apply to all documents produced by their staff. All memos are set up in a particular way, as are reports, proposals, business letters, and so on. When employees use these predetermined styles, it is easy to recognize documents that are of a like nature, and printed matter has a consistent and professional look.

Although the concept of styles may be unfamiliar to you, you have probably read many documents that have been formatted using styles. Reports, magazines, brochures, flyers, catalogues, and books often are designed and produced this way. Although you might not be a designer, you can still benefit immensely from using styles.

Following are some tips to help even the novice microcomputer user look like a pro. In this article, we will be discussing Microsoft Word 4.0 on the Macintosh. For the purpose of this article, I am assuming that you are familiar with the basic skills required for formatting text in Microsoft Word: selecting text or

Format with Styles	**Format Yourself**
1) select the paragraph, and 2) apply the style	1) select the paragraph and choose the following: 2) typeface, 3) type size, 4) type style, 5) paragraph alignment, 6) line spacing, 7) paragraph spacing, 8) tab settings, and so on.

Advanced-Level Techniques

Set Default

When you click the Set Default button, you instruct Microsoft Word to open each new Word file furnished with the styles you have created. You can make your default settings as simple or as complicated as you like. For example, if all the documents you create require the use of one style sheet, select each style name and click Set Default after you have finalized your style definitions. If long reports are the exception and short correspondence is the rule, you might want to make some simple text and paragraph formatting choices your defaults. This is easy: select Normal, make the text and paragraph selections you want, and click Set Default.

Default settings are not restricted to the Define Styles dialog box. If you choose the Section and Document dialog boxes, you will notice that you can set default attributes there as well, for page setup, margins, footnote placement, page numbering, and so on.

It is worth mentioning that if you are using somebody else's computer, it is not good manners to change the default settings. You could inflame a normally mild-mannered colleague to spontaneous combustion by erasing the settings that he or she had chosen.

Next Style

Some of you may wish to format as you type your text. "Next Style" can make this easier for you. If a style called Subtitle, say, is always going to be followed by a style called Body, create these styles first; then select Subtitle in the list of styles, and type Body in the box to the right of Next Style (you will have to delete the existing Next Style first). Now, when you have typed the text for a subtitle and applied the Subtitle style to it, your carriage return will tell Microsoft Word to change the style of the text you are about to type to Body. Note that *this feature works only when you format as you type.*

Based on

When you are defining several styles that have many common attributes, you can use "Based on" when you create them. This can accelerate the process of defining and revising styles. You don't have to employ it the first time you work with styles if you find it overwhelming, but it is important to read it in order to understand how "Based on" affects the list of styles in your document.

You have to do some planning when you work with "Based on." Initially, you will have to determine which styles have a lot of features in common. If, for instance, your Titles, Subtitles, and Tertiary Titles all use Avant Garde Demi as the typeface, you could use the first style you create as the base. This is how it's done:

1. Define the first style in the series, Title. Use the following choices: Avant Garde Demi (another typeface will do if you don't have this one on your system), 24 points, align left. Click Apply.
2. Click New Style. Type Subtitle in the box where the style name belongs. Now, type Title in the box to the right of "Based on" and click Apply. (If Title is already in the box, that's OK.) Change the type size to 18 points and click Apply.
3. Click New Style. Type Tertiary Title in the box where the style name belongs. Type Title in the box to the right of "Based on." Click Apply. Change the type size to 14 points and click Apply.
   All of these styles now use Avant Garde Demi (or the font you have chosen) as the typeface, but the sizes vary.
4. In the Define Styles dialog box, select Title. Choose another typeface (Bookman, for example). Click Apply. Now, select Subtitle and Tertiary Title respectively, and look at the font menu. Both of these styles should now be using the new typeface.

There are some things you must keep in mind when you decide to base certain styles on other styles. Only the elements *which are exactly the same* will change when you make changes to the base style. If, when you were defining your styles, you had chosen Times as the typeface for the Subtitle, Times would not have been changed to Bookman when you altered the original style.

If you set up your styles using this technique and later find all the automatic changes irritating, you can break the connection with the base style. Simply select the styles you wish to liberate, delete the name of the base style in the "Based on" box, and click Apply or OK.

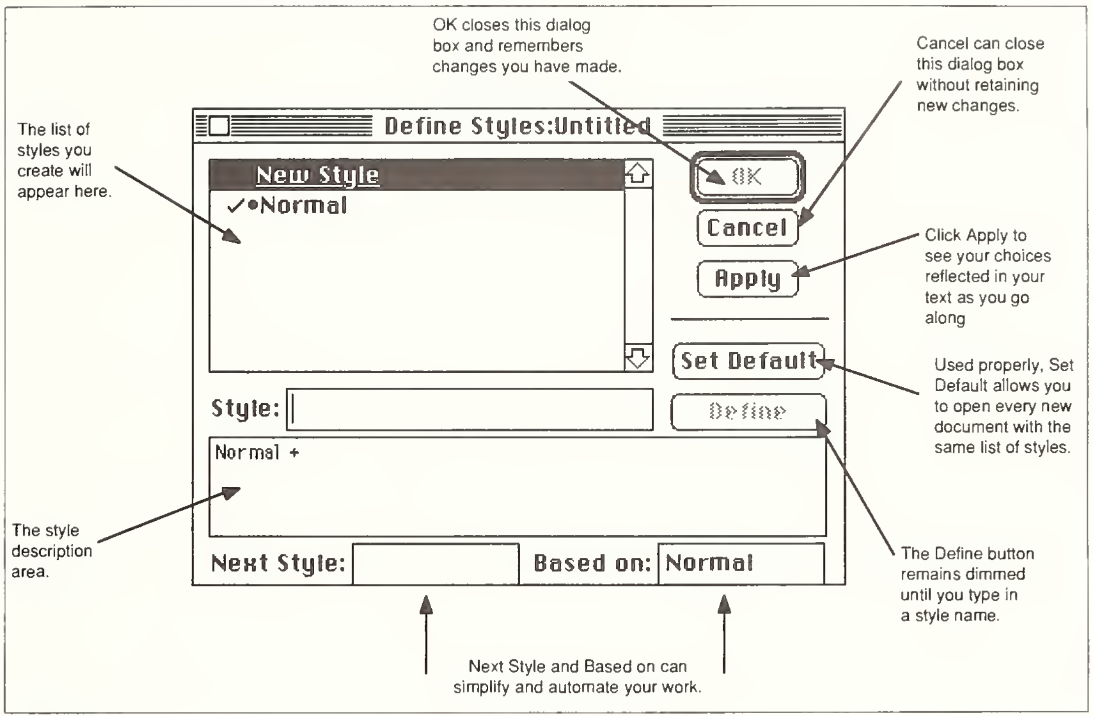
paragraphs, changing typeface and type style using the pull-down menus or character panel, changing paragraph alignment using the ruler icons or keyboard shortcuts, and so on.

Five Steps to Success

There are five basic steps or stages involved in formatting a document using style sheets: preparing and organizing your work, setting up and cleaning up your document, defining styles, changing styles, and applying styles. Some of the explanations are rather lengthy, but don't allow yourself to be overwhelmed and dissuaded from trying. It takes time to master any skill—you learned to walk before you learned to run, after all.

Step One: Preparation

After you have typed your text, print out your file and skim over it. Identify the parts of your document that should look the same, and places where formatting changes are in order. Much like buildings, documents have an architecture. If you keep this concept in mind, you ought to be able to determine where changes in structure make sense without a great deal of difficulty. Titles introduce new chapters or sections. Subtitles (i.e., second-level titles) will start a new thought or topic within a chapter or section. Tertiary titles (i.e., third-



OK closes this dialog box and remembers changes you have made.

Cancel can close this dialog box without retaining new changes.

The list of styles you create will appear here.

Click Apply to see your choices reflected in your text as you go along

Used properly, Set Default allows you to open every new document with the same list of styles.

The style description area.

The Define button remains dimmed until you type in a style name.

Next Style and Based on can simplify and automate your work.

Figure 1

level titles) will organize related paragraphs that belong under one subtitle. Body text will comprise most of the document. The rest you can determine yourself. (The style names that we are using in this article are examples only. If you feel more comfortable using other names, go ahead.) As you identify the components of your document, make a list of them. After you have made your list, you can choose the style characteristics for each part: typeface, type size, type style, paragraph alignment, paragraph indents, and so on. Keep in mind that you are not stuck with the choices you make at this stage; you can always change things later if you want to.

Now, mark the printed copy of the text using a code that makes sense to you (e.g., "T" for titles, "S" for subtitles, "B" for body, and so on). Not only will this help to guide you when you actually begin to format electronically, it will help you to find the places in your document where standard formatting might not apply, indicating that you will have to develop an alternative (e.g., you may have quotations that require left and right margin indentation, or bulleted or numbered lists with hanging indents).

Step Two: Set Up and Clean Up

Open your Microsoft Word document. Make sure that your file is set up to give you access to Microsoft Word's full menus. If you are unsure of your menu setup, click and hold at the Edit menu. If "Full Menus" is the last item you see, select it to turn on Full Menus. If you see "Short Menus" near the bottom of the list, Full Menus are already on. If you have not chosen to display full menus, you will not be able to create a style sheet.

Select all the text in your document, every last character. Under the Format menu, select Plain For Style. It is essential that you remove any character formatting you may have done, as this can interfere with the successful application of styles. Use the paragraph alignment icon on the ruler to align all your text to the left margin, and the line and paragraph spacing icons to apply single paragraph and line spacing to the entire document.

Step Three: Defining Styles in Word

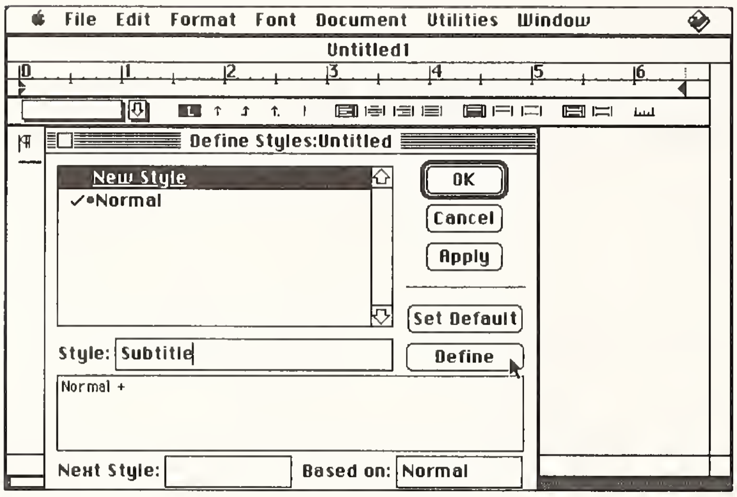
Define Styles is under the Format menu. You will use the Define Styles dialog box to assemble your style sheet (see *Figure 1*). To create styles successfully, you should understand the nature and functions of its various parts. When the Define Styles dialog box appears on your screen, you will see the list of styles available in your document. In a new document, you will see New Style and Normal. Styles that you create will be added to this list, and will appear in alphabetical order. A check mark next to a style name indicates that your cursor is in a paragraph that presently has that particular style applied to it.

Below the list of style names is a style description area. When you click on a style name, the style description area tells you all the character and paragraph formatting that has been chosen for that style.

There is also a selection of buttons. The OK button allows you to apply a style to a currently-selected paragraph or paragraphs and close the dialog box simultaneously. The Cancel button allows you to close the dialog box without saving new changes, but does not erase any styles you might have created or applied previously; however, if you click Apply before you click Cancel, changes will be remembered. The Apply button allows you to experiment a bit when you make formatting choices; you can see changes reflected in your text without closing the dialog box. The Define button allows you to set the name of a new style without closing the dialog box.

For information about Set Default, Next Style, and Based on see the sidebar "Advanced-Level Techniques."

When you have completed Steps One and Two (preparation and



Style: Subtitle

Normal +

Next Style:

Based on: Normal

Figure 2

Figure 3

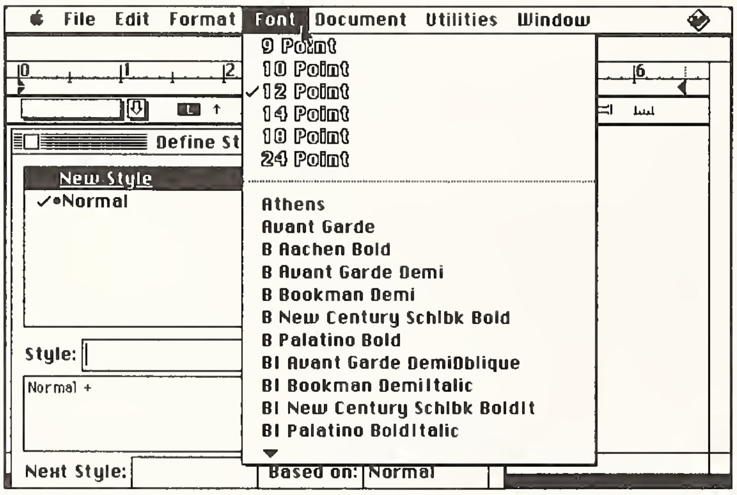
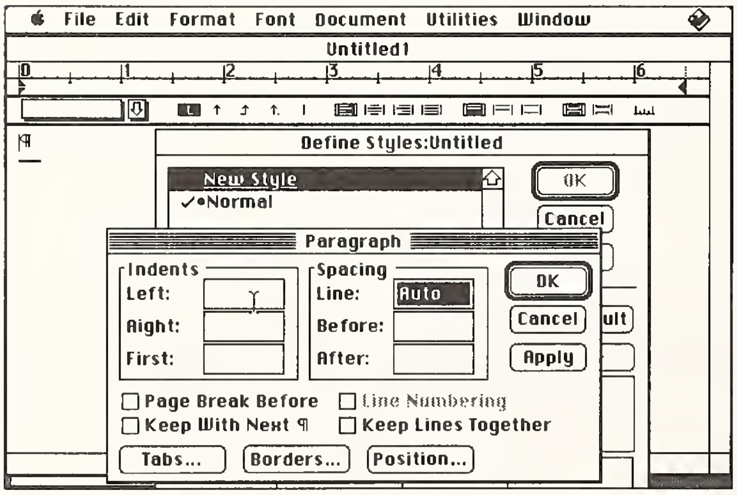


Figure 4A



Line: Auto

Before:

After:

setup), you are ready to begin. Select the first paragraph you want to format. For the purpose of this exercise, we will assume it is a subtitle. Choose Define Styles. Click New Style, then type the name of your new style in the box where the cursor is flashing (you should see "Style:" to the left of the box). Click Define to set the new style name (see *Figure 2*). Now, using the pull-down menus (*Figure 3*, the ruler, and the desired text and paragraph dialog boxes (*Figures 4A* and *4B*), go ahead and apply some character and paragraph formatting. Choose Helvetica, 14 points, bold, small caps. If you want to see how it looks, click Apply; the choices you have made will be reflected in the paragraph you selected. If you can't see your text, move the Define Styles dialog box around on your screen until you can. Click OK to close the dialog box.

Now, select a paragraph of body text and follow the same procedure. Choose Times for the typeface, 10 point for the type size, and click the icon on the ruler that controls double spacing between paragraphs. Click OK to close the dialog box and return to your text. (If you change your mind about a style you have created and wish to remove it from the list, select the style name, and then choose the Cut command from the Edit menu.) Once you have set up your styles, you are in a position to go ahead and apply them to the rest of your document.

Step Four: Changing Style Definitions

You can change your style definitions at any time. Open the Define Styles dialog box, click the name of the style you want to change, and then make the changes you want using the same procedures you used to create them, by using the ruler icons, pull-down menus, and relevant dialog boxes. If you make changes to only one style, but notice that unexpected parts of your document have changed, read the sidebar, "Advanced-Level Techniques," where *Based on* is discussed.

Step Five: Applying Styles and Copying Styles Between Documents

Scroll to the top of your document when you are ready to apply your styles. Click your cursor anywhere in the first paragraph to which you want to apply a style. Using the pull-down style menu on the left-hand side of the ruler, click and drag to select the name of the style you want (*Figure 5*). When you release the mouse button, the formatting instructions in that particular style will be applied to the entire paragraph. An advantage of using styles is that you don't have to select each letter that you want to format as you would when you are doing character formatting. One click in the paragraph is sufficient. (Some word processors allow you to apply a style to a selected range of text within a paragraph, but Word is not one of them. See "Local Changes" to learn about formatting within a styled paragraph.)

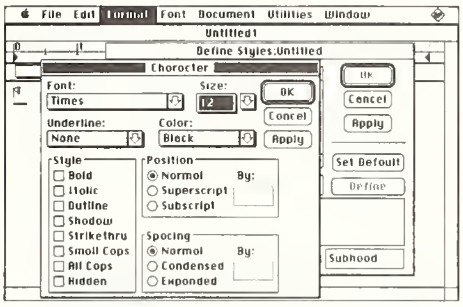
If you have several consecutive paragraphs which require the same style, select the paragraphs and apply the style. All of the paragraphs in the selection will be affected.

Repeat this procedure until you have formatted your entire document.

(Note: There are other ways of applying styles; the method described above is the easiest for beginners. See pages 348-349, "Applying Styles," in your *Reference to Microsoft Word* manual for details about the other methods.)

Styles that you create for one document can be used for many, by simply copying them from one Microsoft Word document to another. This is how you do it:

1. Open the file which is to receive the style sheet you created elsewhere. We will call this the "destination" file.
2. Choose Define Styles.
3. Using your cursor, choose Open under the File menu.
4. When you see a panel that says "Choose a Style Sheet", work your way through the pop-down list of folders (*Figure 6*) and filenames until you find the file that contains the style sheet you want to copy. This is the "source" file.
5. When the the name of the file you are looking for appears in the list on the left, select the name and click OK, or double click the filename (*Figure 7*). Shortly, you will see the names of the styles you have copied appear in the Define Styles panel of the destination file. (Note: If you have created any new styles in your destination file and have given them the same names as the styles in the source file, the formatting information from the source file will override that in the destination file.
6. Click Cancel to get back to your document.



Font: Times

Size: 12

Underline: None

Color: Black

Style

☐ Bold

☐ Italic

☐ Outline

☐ Shadow

☐ Strikethru

☐ Small Caps

☐ All Caps

☐ Hidden

Position

● Normal

○ Superscript

○ Subscript

By:

Spacing

● Normal

○ Condensed

○ Expanded

By:

Figure 4B

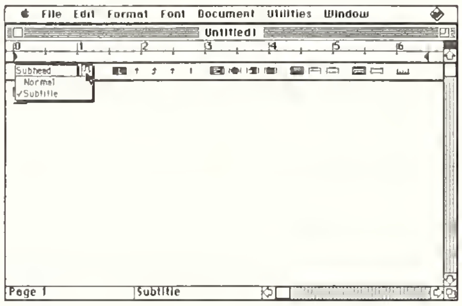
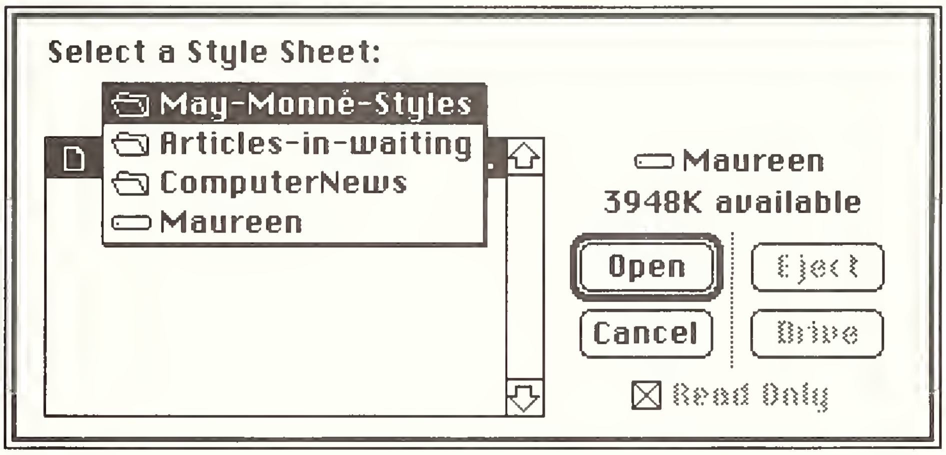
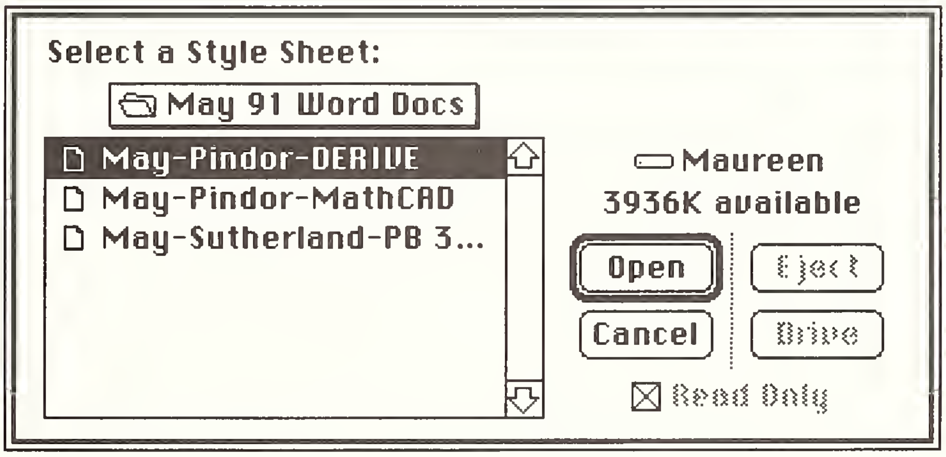


Figure 5



Select a Style Sheet:

Figure 6



Select a Style Sheet:

Figure 7

Local Changes

When necessary, you can override a style. For example, if you want to make some text in a styled paragraph bold or italic, or if you want to change the typeface, you can do so by selecting *all* the text you wish to change, and then making the changes using the appropriate pull-down menus and dialog boxes. If, at a later time, you make changes to the actual style in the Define Styles dialog box, any local formatting you have done will be retained.

Words of Encouragement

If the thought of doing all this work is causing you alarm, you can accustom yourself to the idea of using styles by practising with Microsoft Word's default style sheet. This style sheet, which contains 33 styles, is supplied to you when you hold down the Shift key and then choose Styles or Define Styles from the Format menu.

You can modify these styles if you wish, but keep in mind that you can make changes in new documents and the current document only. You will not be redefining the program's default style settings.

Finally, Some Gentle Persuasion

To style, or not to style? The answer is obvious, I think. Admittedly, you will have to commit yourself to an investment of time and energy in order to master this powerful formatting tool. However, when you consider the benefits that will come your way, the long-term rewards should more than compensate for the initial effort.

Style Tips

Keep it Simple

Many people using word-processing software for the first time succumb to the temptation to use all of the program's formatting features, possibly trying to compensate for the shortcomings of the typewriter. The initiative is admirable, but inappropriate when dozens of these features are employed in a single document or, worse, on a single page. It is not difficult to create a visual cacophony through misplaced enthusiasm. Practise restraint.

Do It Yourself (sometimes)

If you are typing letters and memos, you can forget about creating styles but try to stick to one typeface (two at the most!). You may have 20 installed on your machine, but that doesn't mean you have to use them all at the same time. If you want to add emphasis to particular words or phrases, italicized or boldface text—used sparingly—will help draw attention to what is really important.

Occasionally, you may have to "force" things to fit. Try increasing the point size of your type to fill up space, or reducing it to get all your text on one page. You might also want to adjust the amount of margin space, or the space between lines and paragraphs as necessary.

Not a Style, but Still Important

The margins you set using the Document command under the Format menu are the foundation that supports your text. These margin settings apply to every single page of your document. If the final copy of your document will be printed on paper that has a company logo, for instance, on the top or bottom of every page, make allowances for that when you set your margins. If your document is going to be inserted into binders and will require three-hole punching, or will have some sort of plastic binding, allocate some extra space to the left margin so you won't 1) accidentally punch holes through your text; or 2) have a document that looks unbalanced or crowded at the left. Two-sided documents are slightly more complicated, but the *Reference to Microsoft Word* manual explains clearly how to set them up. (See pages 182-186, "Planning the Size and Layout of Your Margins.")

Order of Operations

Organization is the key to successful document production. I strongly recommend that you do your typing first and formatting last. It is difficult to maintain a steady typing speed if you have to interrupt yourself regularly to implement a style change. When you have entered all your text and run a spell check, then you can begin your formatting.

If most of your document is going to require one style (e.g., Body), select your whole document and apply Body to everything. Then apply the correct styles to the paragraphs which require different formatting. You can save yourself a lot of time this way.

Outlining in Style

Geoffrey Rockwell
rockwell@gpu.utcs.utoronto.ca

Few Macintosh Microsoft Word users dare to use the Outline feature. Lurking under the Document menu, it can instantly make your document unrecognizable. For the brave few, here is a way of not only using the Outline feature, but of also using it in conjunction with styles.

When you choose "Outlining" from the Document menu, you switch to a view of your document where paragraphs of text can be treated like objects to be rearranged, collapsed, promoted, or demoted. The first thing you notice when you switch to the Outlining view is the new ruler (illustration next page). You will also notice that each paragraph has a handle, a small box, that signals its position in the outline.

The handles and ruler are used for moving the objects around. If you want to move one paragraph above another, you drag its handle upward. Alternately, you can select the paragraph and click the up arrow (↑) on the ruler. You can also collapse paragraphs of body text under a heading, so that you only see the first line of each paragraph, by clicking on the "ellipsis" icon (…) on the ruler.

If you have a structured document like a report with headings and subheadings, it is possible to collapse the report in the outlining view so that you only see the first level of headings. You can then drag a first order heading around and bring all its associated subheadings and text with it. Imagine being able to see only the chapter headings of a thesis and rearrange the chapters and their contents with simple gestures.

To go into more detail about outlining is beyond the scope of this article; what I will address is the relationship between outlining and styles. What follows assumes that you have some familiarity with outlining in Microsoft Word.

The key to using outlining and styles together is to realize that the moment a paragraph is given a rank level in the outline it takes on a heading style. Level one paragraphs take on the *heading 1* style, level two paragraphs take on the *heading 2* style, and so on. When you promote or demote a paragraph you are changing its associated style. If, in the outlining view, you drag the handle of a paragraph so that it becomes a level 2 heading, the paragraph will take on the characteristics of the *heading 2* style. You may see no immediate change in the outlining view because it is possible to turn the character formatting off so that all the text is in the same font and point size, but when you return to the normal view, the paragraph will have the characteristics of the style.

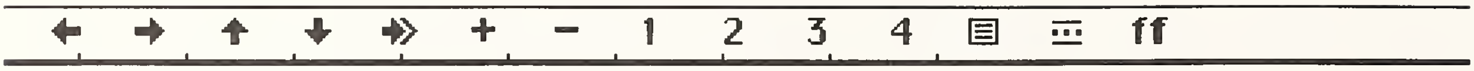
The heading styles are default styles. To see how they are defined and to change their definition you need to hold down the Shift key and choose "Define All Styles" from the Format menu. The default styles will appear in the styles list with bullets (•) before them, indicating that you can change these styles but you cannot delete them. This is how the default styles of the first four levels of outlining look:

• Heading level 1. This is text in the "heading 1" style. The text is 12 point, bold, and underlined.

• Heading level 2. This is text in the "heading 2" style. This is similar to the Heading 1 style, without the underlining.

> **• Heading level 3. This is text in the "heading 3" style. Note how the style applies to the entire paragraph, not just one line. In this style, there is a half inch left indent.**
>
> • Heading level 4. This is text in the "heading 4" style. It is similar to the "heading 3" style; underlining is used instead of bold.

How are styles of outlining useful? In structured documents that have multiple levels of headings, like reports, it is important to maintain formatting consistency. All third-level headings should have the same characteristics so that the reader immediately knows that he is not starting a new second-level section. This can be achieved by creating your own styles, but if you redefine the outline heading styles you get added functionality; you can view the document in the outlining view, where you can choose to see



The ruler available in outlining view.

only the levels of headings that you want—an "outline" of the document. The outline view becomes a flexible environment for zooming in and out of your document. You choose how much you want to see.

The outlining view is useful for navigating a document. You can jump to a particular section by switching to the outlining view, clicking on the heading for the section you want, and then returning to the normal view. It works like an interactive table of contents.

The outlining view is particularly useful when planning (or outlining) your document. You can map out the parts of the report that need to be there, rearrange them until you are satisfied with the order and level of each section, and then return to the normal view to fill in the text. If, while writing, you change your mind about the importance of a section and want to promote it, you can switch to the outlining view and move the section up a level or move it closer to the beginning of the report.

The bad news is that the default styles that come with Word are not what most of us would use in our reports or papers. I don't like underlining or centred headings.

However, I can change the format of the styles to suit my own preferences. For example, I use large point sizes for major headings, indentations, and paragraph spacing. Here is an example of one set of heading styles I use:

THIS IS A LEVEL 1 HEADING

THIS IS A LEVEL 2 HEADING

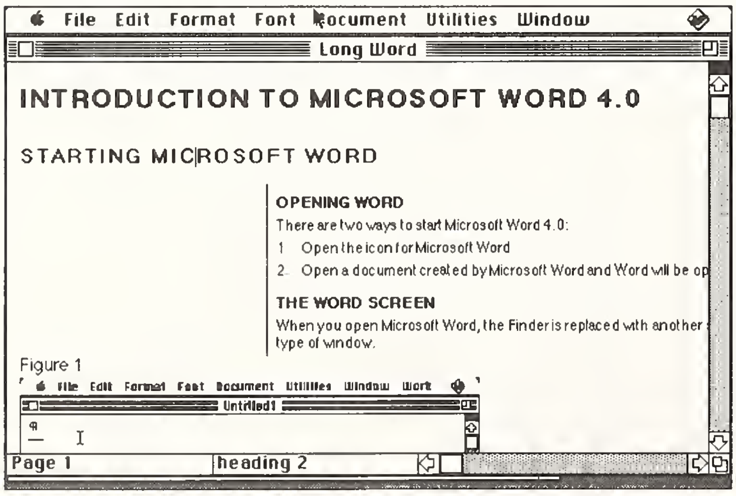
This is a level 3 heading

Here is a sample of the normal (body) text.

By assigning paragraph spacing (extra space at the beginning and end of the paragraph) I can make headings stand out by virtue of the white space between them and the surrounding text. This means I don't have to depend on loud styles with underlining to set off my headings. The point is that you can control the look by redefining the styles. Keep in mind that there is a lot more to play with than underlining, bold, and paragraph indentation. You can have paragraph borders (lines around the paragraph.) You can change the justification so that some titles are right justified for an unusual look, and you can experiment with different typefaces (Cairo always gets their attention!).

Learning to use styles and the outlining view in Microsoft Word is not a trivial task, but it is worth the effort if you routinely create structured documents with lots of headings and sections. While not as useful for the typical academic paper in the humanities (with usually one title and one level of headings), learning to use the outlining view might help you when planning a paper. If you want further information or a demonstration of outlining and styles, contact Harriet Ji at 978-6050.

Normal view in Microsoft Word.


File Edit Format Font Document Utilities Window
Long Word
Page 1
heading 2

INTRODUCTION TO MICROSOFT WORD 4.0

STARTING MICROSOFT WORD

OPENING WORD

There are two ways to start Microsoft Word 4.0:

1 Open the icon for Microsoft Word

2. Open a document created by Microsoft Word and Word will be op

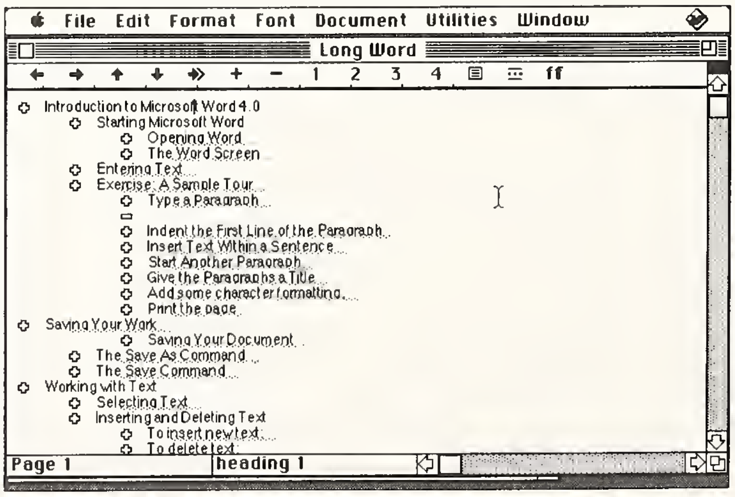
THE WORD SCREEN

When you open Microsoft Word, the Finder is replaced with another type of window.

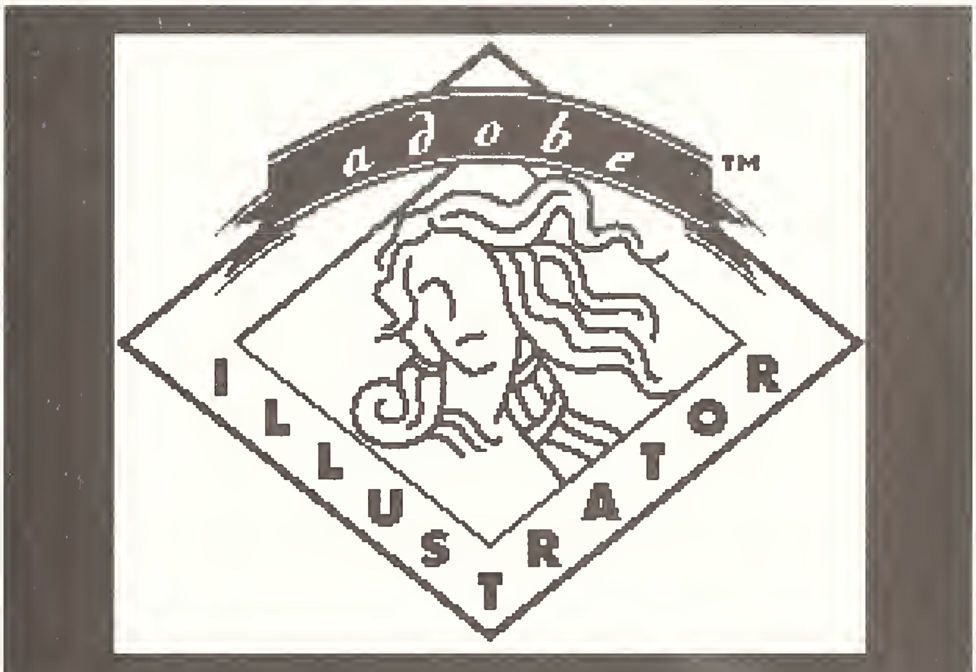
Figure 1

File Edit Format Font Document Utilities Window Work
Untitled1

Outlining view in Microsoft Word.



- Introduction to Microsoft Word 4.0
  - Starting Microsoft Word
    - Opening Word
    - The Word Screen
  - Entering Text
  - Exercise: A Sample Tour
    - Type a Paragraph
    - Indent the First Line of the Paragraph
    - Insert Text Within a Sentence
    - Start Another Paragraph
    - Give the Paragraphs a Title
    - Add some character formatting.
    - Print the page.
- Saving Your Work
    - Saving Your Document
  - The Save As Command
  - The Save Command
- Working with Text
  - Selecting Text
  - Inserting and Deleting Text
    - To insert new text:
    - To delete text:



Adobe Illustrator 3.0

Terry Jones
tj@gpu.utcs.utoronto.ca

Adobe Illustrator for the Macintosh is a program for creating freehand illustrations. Version 3.0 makes enhancements to this already-powerful software, and adds charting capabilities for more business-oriented applications.

Text Handling

One of the biggest improvements to Illustrator 3.0 is the way it handles text. When you wanted to add text in the old version, Illustrator displayed a text dialog box in which you did your typing. All text entered into any one text dialog box had to use the same font, size, and style. Now you can mix font sizes, styles, colours, and leading within any on-screen text block.

You can enter text in several ways, including importing it from a word processor. You can use the Type tool for basic typing. For more interest and impact, you can use the Area-type tool to type your text in an area block, in an oval, or within a polygon. You can align text on a curve with the Path-type tool.

We found one small irritation with the type tools. If you want to type text in several different areas on your page, you have to deselect the original type area before you can click to start in a new location. If you hold down the command key, which temporarily turns the text tool into a pointer, and click any blank area on the page, you will be able to click your type tool somewhere else on the page and start typing your text in the new area. Otherwise, the cursor will appear in the currently active text area regardless of where you click.

Illustrator 3.0 also provides automatic kerning, tracking, hanging punctuation, paragraph spacing, and horizontal character scaling in the Type Style dialog box. It still does not automatically indent lines for creating initial caps. Adjustable superscripts and subscripts, justification, and discretionary hyphenation have all been added to the text controls. Even if the text block is skewed, rotated, or scaled, the cursor creates an insertion point wherever you click, letting you edit your text directly. Text can flow from one text area to another if you link the areas. Tab stops and automatic hyphenation are not available.

Adobe includes Adobe Type Manager (ATM) in the package. You must install this software in order to use the option that allows you to convert text into character outlines (from ATM outline fonts) for customizing. These character outlines can be manipulated just like any other graphic in your drawing. Running ATM is also essential for reasonable performance and high-quality screen display.

New Tools

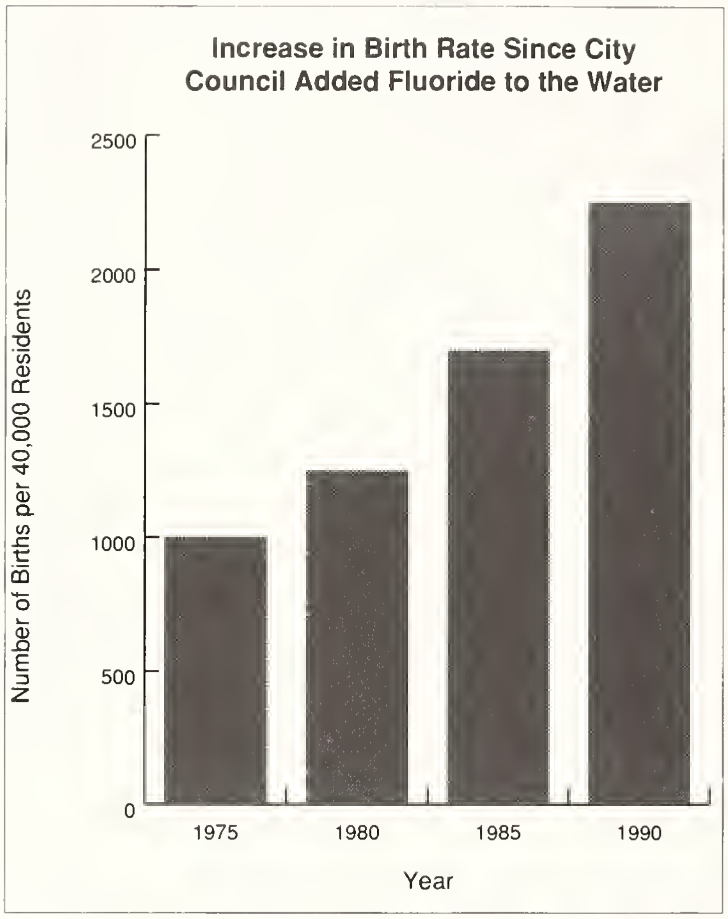
Illustrator 3.0 has some new tools as well, including the direct-selection tool, the path-adjustment (scissors) tool, and the charting tool.

The direct-selection tool lets you select grouped and ungrouped objects. You can select groups within groups or parts of grouped paths, and then edit without having to ungroup anything.

Adobe has expanded the scissors tool to include three path-adjustment tools, which provide much greater control when you edit polygons. As well as the original scissors tool, there are tools which let you add and delete anchor points, plus a tool that lets you convert a corner point to a curve or a curve to a corner point.

Illustrator's new charting tool is powerful and easy to use. Simply select the chart tool, then click and drag to define the size of the area you would like your graph to occupy. A dialog box where you will enter your graph data will appear. When you have entered the data (or imported it from a spreadsheet), Illustrator creates your chart. The chart types include bar, stacked-bar, pie, scatterplot, area, and line charts.

As much as I like the idea of a charting tool built right into Illustrator, the present tool is weak when it comes to scientific charts, which are the most common request in the University environment. Log-log, semi-log, error bars, and many other features important for journal style charts are not available.



You can use any of Illustrator's drawing tools to create something called a graph design. You create some artwork, group it inside an unstroked, unfilled rectangle, then choose a menu command to define it as a graph design. You can use graph designs in several ways. In a column chart, you can use the design instead of solid columns. Designs can be scaled either uniformly or in the vertical dimension only. You can assign a numeric value to the design; this design is repeated to reflect the value of the column. Moreover, you can define a sliding design, in which only a portion of the design is scaled. (This is more difficult to do, so read your manual carefully and have patience!) For line graphs, you can use a design in place of data markers.

When you create a graph, Illustrator forges a link between the data in the Graph data dialog box and the graph it draws for you. If you change the data, the graph will be updated to reflect the change.

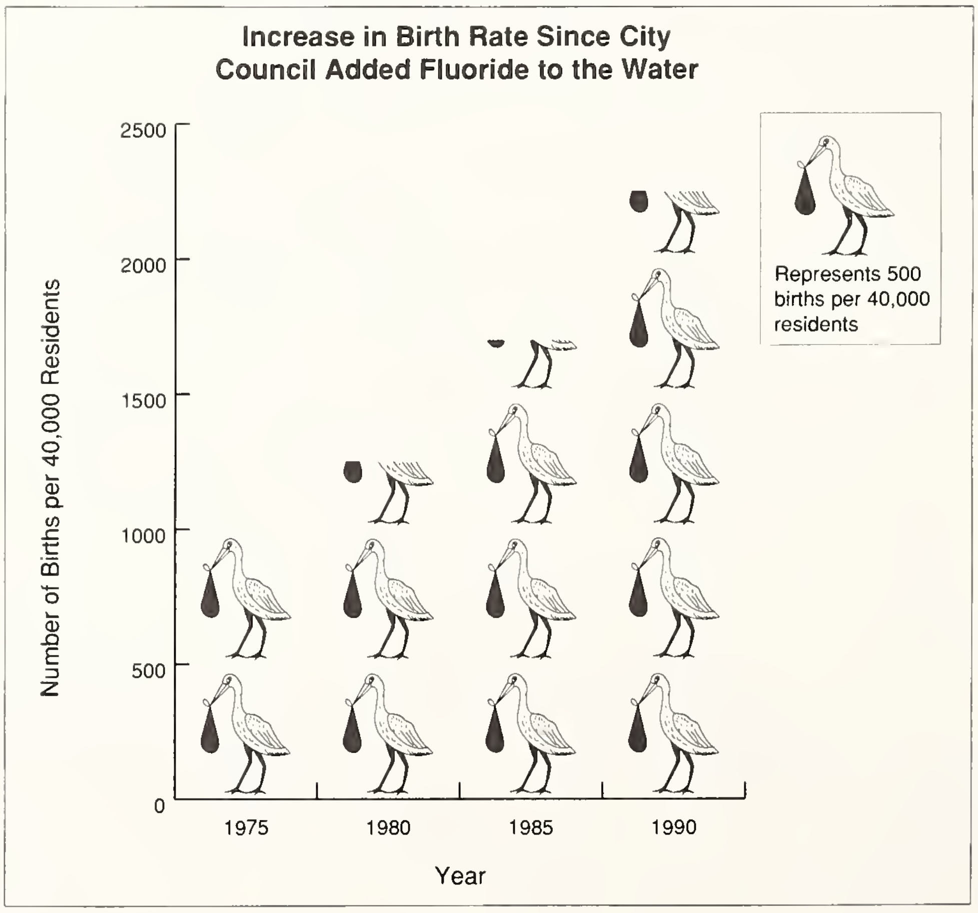
Graphs are created as grouped objects, but you can edit them using the Direct-selection tool and any of Illustrator's other options. **Warning**: think twice about ungrouping any elements of your graph. Ungrouping turns the graph into a mere illustration, and the link with the Graph data dialog box is lost. If you have to update your data, you will have to create a new graph from scratch in order to see the changes you want. Regrouping the elements of the ungrouped graph doesn't help.

Interface Changes

Toolbox

The most obvious change to the user interface is the addition of pop-up icons to the toolbox. In most cases, they give direct access to functions, such as zooming out, that formerly were available only when you used mouse and keystroke combinations. While Illustrator 3.0 retains all the mouse and keystroke shortcuts of the previous version, the pop-up tools make the program much more intuitive to use, and certainly easier for the occasional user.

An ordinary chart (left) has more visual impact when you use a repeating graph design (below).



Paint Menu

You can now create punch-outs (transparent areas) in overlapping shapes by selecting the art objects and choosing Make Compound from the Paint menu. This enables you to layer shapes and see through to patterns or fills in the backmost layers.

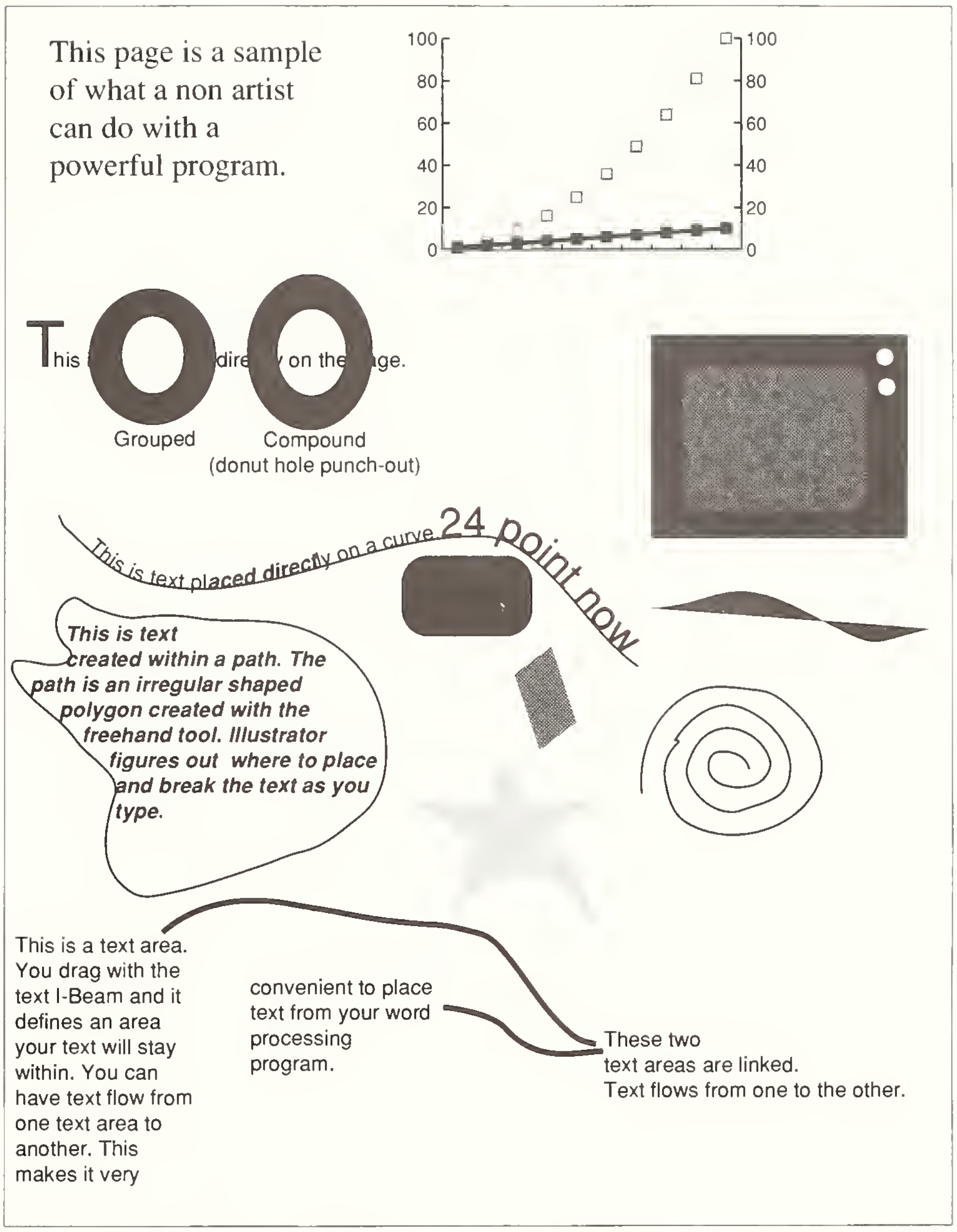
View

Rather than waiting for a complete screen redraw to preview the entire screen, you can now preview just selected items, and you can undo your last command after previewing.

You can also create an extra window for viewing your work. When you choose New Window from the Window menu and place the two windows beside each other, you can watch the progress of your illustration in the standard drawing views (Artwork & Template and Artwork Only) and Preview Illustration view simultaneously. With this arrangement, you can use the new Apply button in the Paint dialog box. This button lets you experiment with the paint options and view immediately the results of your choices in the window that is in Preview mode (similar to the Apply button in Microsoft Word's character panel). When you use Apply, you can avoid clicking OK and closing the box, and maybe having to go back a few times until you get the look you want.

Preferences

You can now view placed images in grey scale or colour. The Split Long Paths on Save/Print option has been changed to either on or off. You can develop and save a user-preferences file that makes specific fonts, patterns, custom colours, and graph designs immediately available on startup. The printing scheme has been changed so that the active page is page one (not page five), but tiled pages are still available.



This page is a sample of what a non artist can do with a powerful program.

This is text placed directly on a curve. 24 point now

This is text created within a path. The path is an irregular shaped polygon created with the freehand tool. Illustrator figures out where to place and break the text as you type.

This is a text area. You drag with the text I-Beam and it defines an area your text will stay within. You can have text flow from one text area to another. This makes it very convenient to place text from your word processing program.

These two text areas are linked. Text flows from one to the other.

Printing

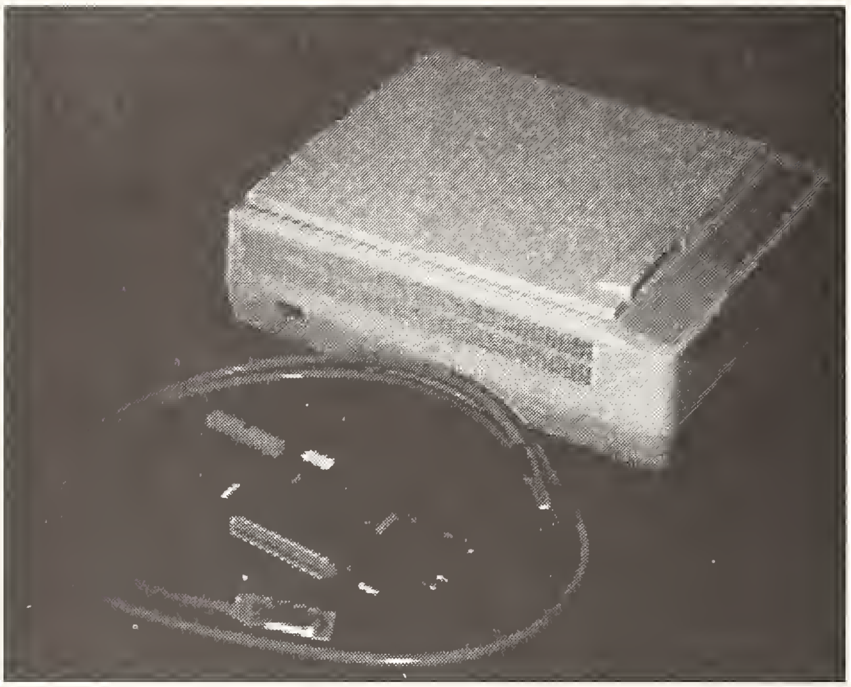
There is little support for non-PostScript printers. Adobe makes Illustrator and Adobe makes PostScript. Adobe makes them work best together. Don't expect to get fantastic quality out of the inexpensive QuickDraw printers that Apple and Hewlett Packard offer. You should use them to produce draft copies only.

The program requires at least a Macintosh Plus, two megabytes (MB) of Random Access Memory, and a hard drive; you will need approximately 3.5MB of free space on your hard disk to install all the files. A Macintosh II is recommended and certainly makes working with colour much easier.

The package includes utilities that handle colour separation for Illustrator files and convert PICT files into PostScript drawings.

For more information about Illustrator 3.0, contact Terry Jones at 978-4924.

Colour Scanners: Sharp JX300, Abaton Scan 300/Color, Microtek MSF300ZS



The Sharp JX300

Terry Jones
tj@gpu.utcs.utoronto.ca

In recent months, the prices of full-sized colour scanners for personal computers have dropped considerably. It is now possible to purchase a colour scanner for about the same price that a black-and-white scanner would have cost a few years ago. These colour scanners virtually can replace their black-and-white predecessors, since they can scan in both black-and-white and colour mode.

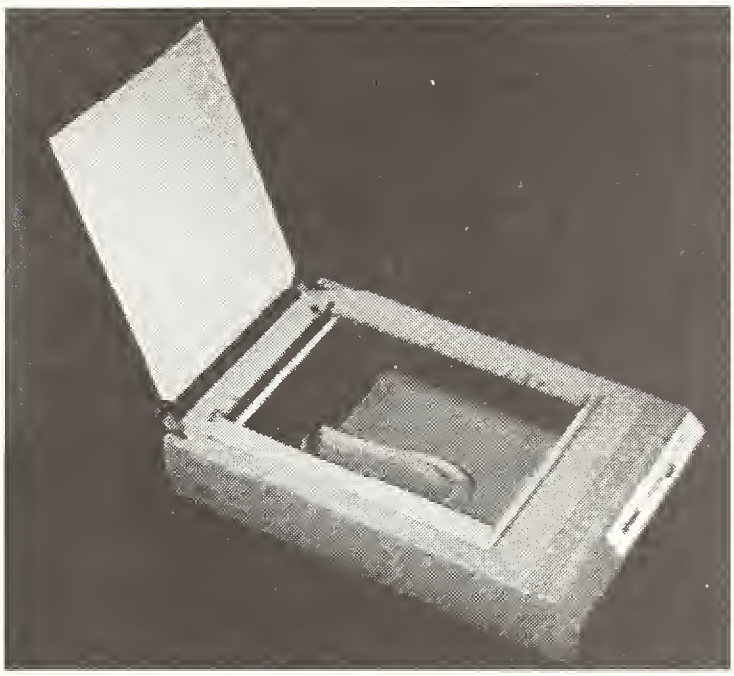
I recently had three colour scanners on loan for evaluation: the Sharp JX300, the Abaton Scan 300/Color, and the Microtek MSF300ZS. All three can scan at resolutions of up to 300 dots per inch and can recognize up to 16 million colours. I evaluated them using an Apple Macintosh IIx computer, but with appropriate interface adapters they could also be used with MS-DOS computers. I chose to evaluate the scanners on the Macintosh because I could use the same software, Adobe Photoshop, with all of them. In fact, all three scanners were accessible at the same time from within Photoshop in the Macintosh environment.

The first thing that prospective users of colour scanners need to be aware of is the “monster-size” files colour scans create. For example, an 8 x 10 inch drawing scanned as black-and-white (1-bit “line art”) will occupy approximately 900 kilobytes (.9 megabytes) of disk space. An 8 x 10 inch black-and-white photograph scanned as 256 shades of grey (8-bit “grey scale”) will take up 7.2 megabytes. An 8 x 10 colour photograph scanned as 16.7 million colours (24-bit “true colour”) will produce a 21 megabyte file. Reducing the number of colours and the scanning resolution, which all three scanners can do, allows you to trade some image quality for a reduced file size. Unless you are working with extremely demanding colour applications, these scanners are capable of much higher quality than you probably require.

All three scanners are flatbed scanners. They operate much like photocopiers in that you place the original image face down on the glass. The Microtek and the Abaton scanners are 8.5 x 14 inch scanners, whereas the Sharp is 8.5 x 11 inches. The larger size is generally not necessary when you are scanning colour images. Most photographs are 4 x 6 inches or 5 x 7 inches. Larger pictures are usually a maximum of 8 x 10 inches or 8.5 x 11 inches. It is rare to actually need to scan a colour image as large as 8.5 x 14 inches. A large scanner is more useful when you are scanning black and white images, or when you are using the scanner with Optical Character Recognition (OCR) software.

The Abaton and the Microtek scanners can be connected to any Macintosh using the built-in SCSI interface. The Sharp scanner uses a General Purpose Interface Board (GPIB). This means you can connect the Sharp scanner only to Macintosh computers with expansion slots (i.e., Macintosh II family). To move the Sharp scanner from one machine to another, you must open the Macintosh and move the card as well.

For colour scans, the scanner collects separate red, green, and blue information about the picture,



Abaton Scan 300/Color

Microtek MSF300ZS

either in one pass or in three passes. With a single-pass scanner, the scanning mechanism collects red, green, and blue data for one part of the scan before it moves on to the next part. In a three-pass scanner, the scanner collects all the red information for the whole area you are scanning, then goes back and collects the green information, then the blue. Single-pass scanners are generally quicker than three-pass scanners; the single-pass Sharp scanner was noticeably faster than the other two.

One of the most significant differences between the scanners is the software that is bundled with them. The Sharp scanner comes only with drivers for various programs. The other two are sold with very high-quality image editing programs. Presently, the Microtek and Abaton scanners come bundled with Adobe Photoshop. This is a first-rate product that retails by itself for around $700.

Appropriate PC scanning software comes bundled when you purchase a scanner for use with a PC. Usually you receive a Windows 3.0 program such as **ImageStar** or **ColorLab**. The software bundles are subject to change, so check with your dealer at the time of purchase.

All three scanners include "plugs" for Adobe Photoshop. These are software interface routines that enable you to scan directly into Photoshop. All of these interface modules allow you to preview the area you want to scan and choose the scanning mode (1-bit black and white, 8-bit greyscale, 8-bit colour, 24-bit colour, and so on). You can also preview and select portions of the area you want to scan. I had one complaint with the Abaton interface, in that it did not save all the settings between one scan and the next. If I wanted to rescan the same area in a different mode, I had to reselect the area. Both the Sharp and the Microtek interfaces behaved in the expected manner.

None of the scanners produced exactly the same colours on screen as you would see in the original image. To accomplish this requires careful calibration of the scanner and scanning software, and expensive equipment to calibrate your monitor. The scanners did produce what could be called "pleasing" colour, acceptable for most computer applications, if not high-end publishing applications. Pleasing does not equal 100% accurate, however. The

Optical Character Recognition Software

Optical Character Recognition software lets you use a scanner to "read" text from the printed page into your computer. The page is scanned as a picture, then the OCR software tries to recognize the individual letters. This is an enormous task, but there are many good OCR packages available. OCR programs can work on files saved from the scanner software, but it is much better to have OCR software that works directly with the scanner, making the scanning and the character recognition a single task rather than two separate tasks. Make sure the OCR package you select supports the scanner you choose if you plan to scan more than an occasional page of text.

colours in the original image will not be reproduced faultlessly, nor will the colours you see on your screen precisely match a colour printout. For more exact results, traditional colour reproduction methods are still the best.

Both the Microtek and the Abaton units cost considerably less than the Sharp scanner, and both come bundled with expensive image software (at time of writing). I feel that this makes either of these a better purchase than the slightly faster Sharp unit. It is more difficult to decide between the Microtek and Abaton units. I would probably base my decision on the software bundled with the scanner at the time of purchase, favouring the Microtek somewhat because of the slightly better Photoshop interface software.

For more information about colour scanners, contact Terry Jones at 978-4924.

Update on Anti-virus Efforts at UTCS

Jon Alexander
jon@utcs.utoronto.ca

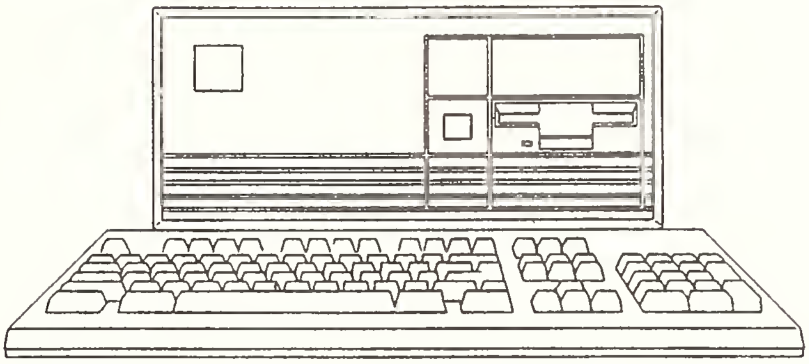
Version 2.5.1 of the Macintosh anti-virus scanner, Disinfectant, is now available. Disinfectant is a program that can search hard disks and floppy diskettes for known viruses. The new version is designed to detect several new strains of Macintosh viruses and to work with the new Macintosh Operating System 7.0. (Disinfectant has some limitations. A major revision, that will be fully compatible with System 7.0, is expected later this year.)

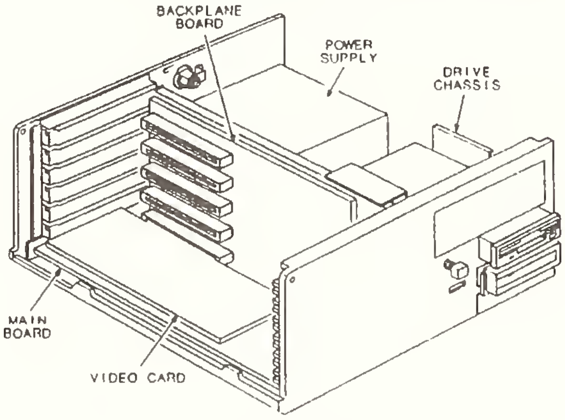
Also available for the Macintosh is a new version of the **GateKeeper** program, version 1.2.1. The companion program, **GateKeeper Aid,** has remained unchanged. This program executes when you start your Mac, and watches for activity that might indicate a virus infection. The new version fixes problems in previous versions of GateKeeper, and adds some extra features for advanced users. The new version will work with System 7.0.

For the IBM PC and compatibles, we are currently reviewing several anti-virus programs, including the latest versions of McAfee Viruscan, Certus, and Fink Anti-Virus. This is being done in conjunction with several Toronto-area universities and colleges.

New viruses are being discovered frequently. UTCS updates its anti-virus programs regularly, and can help you decide which version is appropriate for your needs. Please phone Advising at 978-HELP, between 12 noon and 6:00 p.m. Monday through Friday, for information on how you can choose or update anti-virus software.

The Z386/33E and Z386 SX from Zenith





Inside and outside the Z386 SX.

David Sutherland
davids@gpu.utcs.utoronto.ca

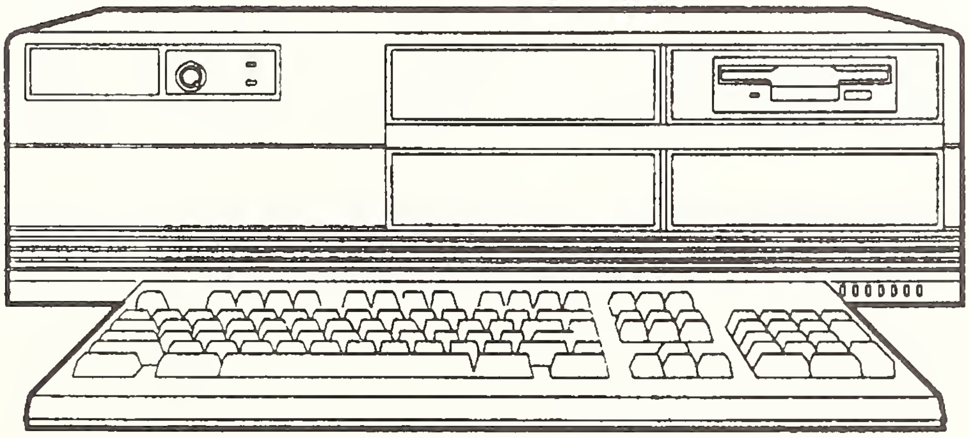
Zenith recently provided two computers for evaluation to the UTCS Information Centre. A beta version of the Z386 SX, featuring an 80386SX central processing unit (CPU), was discussed in the May/ June 1990 issue of *ComputerNews.* Now available as a production machine, it is reviewed here in more detail. The other, the Zenith Z386/ 33E, has a 33 megahertz (MHz) 80386 processor and a high performance EISA bus disk controller. Both computers demonstrate a high level of quality in their design and manufacture.

Software

Each machine is shipped with the MS-DOS version 4.01 operating system and Windows 3.0. For several years now Zenith has extended the facilities of MS-DOS with their own set of utility commands.

In the case of the Z386/33E, there is an additional set of utilities used to configure adapter cards that are installed in the EISA bus. The EISA bus makes it possible for an adapter card, such as a disk controller or local area network adapter, to initiate and control high-speed, 32-bit data transfer. This ability, known as bus mastering, greatly increases the speed at which information is processed.

The Z386/33E.



Documentation

Zenith products come with a rich set of documentation. Included are all the standard MS-DOS references, including Zenith DOS extensions, and Windows 3.0 manuals.

The Z386/33E *Owners Manual* contains clear instructions on configuring the computer (including EISA adapters), adding additional memory, disk drives, and so on. The Z386 SX has a slimmer *Owner's Manual.* However, detailed tables and diagrams provide the basic information needed to configure the system.

The technical features of the Z386/33E computer are:

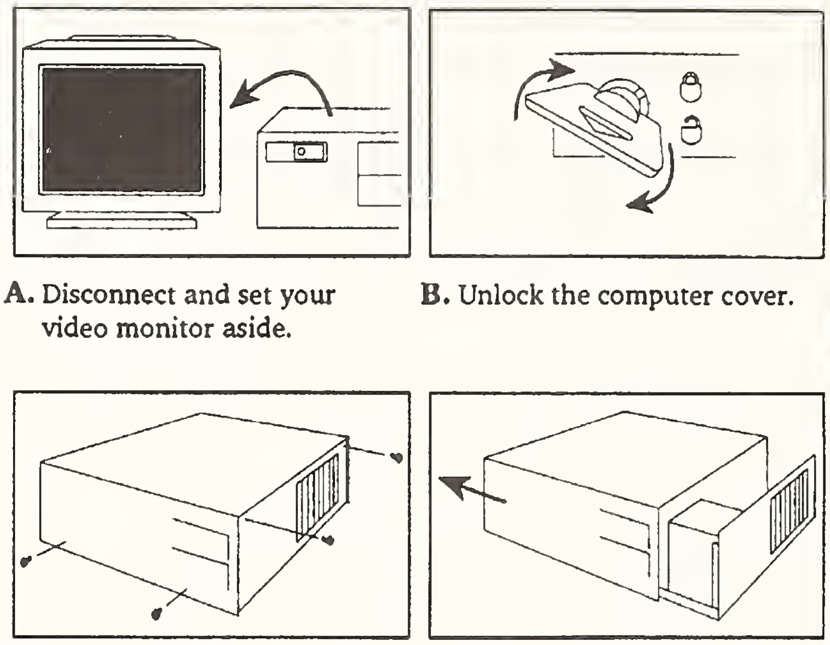
- 33MHz 80386DX CPU;
- 4 kilobytes (KB) memory cache;
- 4 megabytes (MB) of RAM;
- One parallel port, two serial ports;
- A 320MB ESDI hard disk;
- One 1.44MB floppy disk drive;
- One 16-bit video graphics array (VGA) card with 1024 x 768 pixel resolution;
- One Microsoft serial mouse.

The expansion capabilities of the

computer are:
- 20MB of RAM on motherboard;
- 80387 or Wietek 3167 coprocessor;
- Seven EISA slots (that support 16-bit full-length adapters);
- Seven SCSI devices;
- Two 5.25-inch device bays and power connector.

The technical features of the Z386 SX computer are:
- A 20MHz 80386SX CPU;
- 4KB memory cache;
- 2MB of RAM;
- One parallel port, two serial ports;
- A 40MB IDE hard disk;
- One 1.44MB floppy disk drive;
- One 16-bit VGA card with 640 x 480 pixel resolution;
- One Microsoft serial mouse.

The expansion capabilities of the computer are:
- 8MB of RAM on motherboard;
- 80387SX coprocessor;
- Four 16-bit full-length slots;
- One 5.25-inch device bay and power connector.



A. Disconnect and set your video monitor aside.

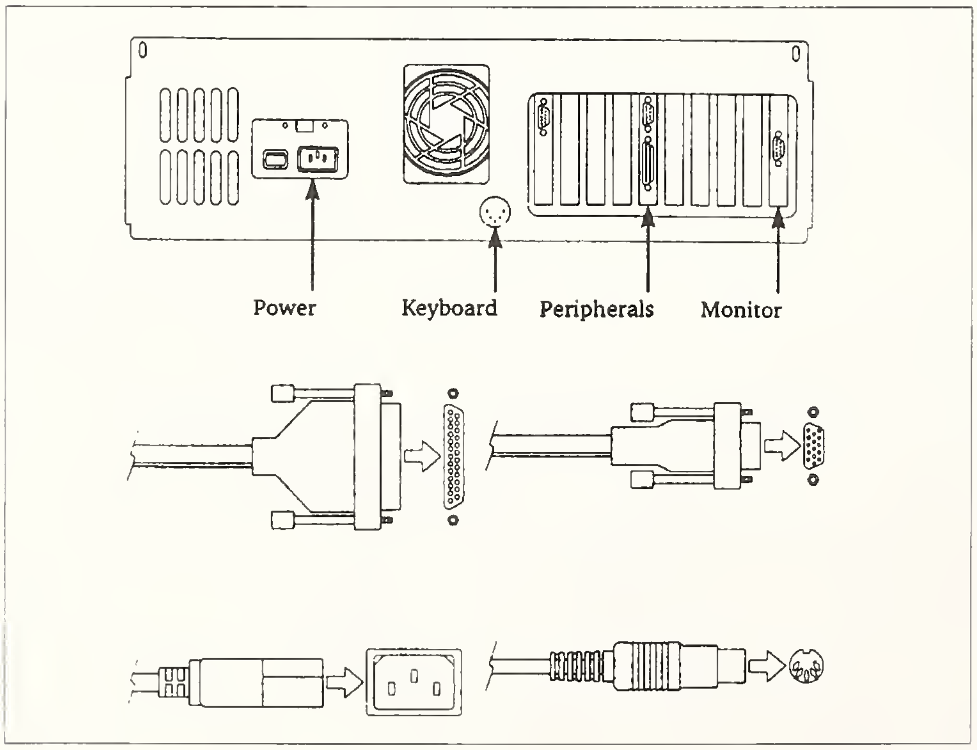
B. Unlock the computer cover.

C. Remove the cover screws from the back and sides.

D. Lift the cover up and slide it off the chassis. Make sure the computer cover does not bind on internal cables or connectors.

The manual illustrates the proper way to open the Z386/33E.

The documentation that accompanies the Z386/33E illustrates clearly where to plug in cables, among other things.



Performance and Compatibility

These computers are compatible with MS-DOS programs. We have used them to run a wide range of applications in the UTCS Information Centre for several months without experiencing any difficulties.

In order to facilitate comparison of equipment reviewed in *ComputerNews* with equipment reviewed in commercial publications, we ran the PC Labs' compatibility and performance test suite, Norton Utilities System Information program, and CoreTest disk speed test. This series of benchmarks provides an arbitrary measurement of a machine's capability. In these benchmarks, the results for the test machine are listed in the first column. For comparison, results from two similar machines are listed in the second and third columns. Readers should expect that practical experience with a specific application may or may not confirm the apparent differences between machines.

Windows 3.0

The Z386/33E ran all our Windows programs quickly and without problem. As would be expected, intensive graphic applications such as CorelDRAW ground to a halt when the operator changed his/her position on the page or zoomed in and out of a document. This effect is true for all computers that use the 640 x 480 pixel resolution of standard VGA. The solution is to avoid zooming in and out by using a higher resolution display adapter and a larger monitor (16 - 19 inches). With a large monitor and high-resolution image, more of a document is displayed on the screen, which minimizes the need to zoom.

Results for the Z386/33E:

Norton Utilities System Information

CPU index:	43.0
Hard disk index:	5.5
Performance index:	30.5

CoreTest

Data transfer rate:	1344.5 KB/sec
Average Seek time:	15.2 milliseconds

Individuals who anticipate working extensively with complex graphics found in drawing, drafting, or desktop publishing should consider that money spent on a fast, high-resolution display adapter and large monitor may provide a better return on investment than purchasing the fastest computer.

The Z386 SX proved to be a credible Windows 3.0 platform. Word processing, spreadsheets, and simple desktop publishing were easily accomplished.

SAS

The Z386/33E has the horsepower to make SAS run fast. We ran the SAS Testbase program without any compatibility problems or errors. Configured with EMS memory installed, the 33E did the test in 3 minutes, 3 seconds. Without EMS memory, the test took 3 minutes and 45 seconds. The fast hard disk and caching disk controller helped speed things up, especially in the file

PC Magazine Laboratory Benchmarks Series Release 5.6

	Zenith Z386/33E	IBM 386/25 70/25 MHz	Compaq 486/25 25MHz
Processor Performance Tests			
Instruction Mix - 8088	1.92	2.41	1.58
Instruction Mix - 80386	1.75	2.19	1.44
Integer Add	0.36	0.49	0.25
Integer Multiply	0.24	0.34	0.24
String Sort and Move	0.50	0.73	0.43
Prime Number Sieve	0.24	0.32	0.13
Floating Point Mix	2.91	4.01	2.36
Disk Performance Tests			
BIOS Disk Seek			
*Sequential	3.35	12.01	3.63
*Random	15.38	21.09	19.88
DOS File Access (small records)	32.24	69.77	50.09
DOS File Access (large records)	5.71	6.47	3.74
Video Performance Tests			
Direct Screen Access	3.08	6.53	1.32
Teletype Without Scrolling	0.22	0.66	0.28
Memory Performance Tests			
Conventional Read		Test would not run	
Conventional Write		Test would not run	

*Speed measured in milliseconds. All other speeds measured in seconds.

comparisons that Testbase runs for error checking.

Running SAS on the Z386 SX was not difficult. With expanded memory configured, the Testbase program took 12 minutes and 37 seconds to run. Without expanded memory, Testbase completed in 15 minutes 46 seconds. If you noticed that the Z386/33E ran Testbase four times faster than the Z386 SX, you should know that the Z386/33E costs about 2.5 times more.

Networking

Both computers were configured with 3Com Ethernet cards. We successfully logged into our Novell server, UNIX host, and IBM mainframe computer from each machine. LapLink successfully transferred files using the serial ports at 115 kilobaud.

Conclusion

Clearly not everyone needs the power of the Z386/33E nor can they afford the cost. Those who do require such a machine should make a detailed analysis of their situation. By determining the optimum combination of features, they can insure that their money is well spent.

The Z386 SX is representative of the type of machine most buyers should be considering. The use of the 80386 CPU chip insures compatibility with the widest range of software. The Z386 SX has more expansion capacity than typical “slim line” units, although at a higher price.

Both of these machines provide above-average quality in design, manufacture, and documentation. Zenith is an established PC manufacturer and supports their equipment with a two year warranty.

If you would like to discuss your requirements for a computer, please call David Sutherland at 978-5426.

Results for the Z386 SX:

Norton Utilities System Information	
CPU index:	18.0
Hard disk index:	5.0
Performance index:	13.6
CoreTest	
Data transfer rate:	540.6 KB/sec
Average Seek time:	26.9 milliseconds

PC Magazine Laboratory Benchmarks Series Release 5.6

	Zenith 386 SX	IBM Model 70A21 25 Mhz	Compaq 486/25 25Mhz
Processor Performance Tests			
Instruction Mix - 8088	4.92	2.41	1.58
Instruction Mix - 80386	4.28	2.19	1.44
Integer Add	0.79	0.49	0.25
Integer Multiply	0.54	0.34	0.24
String Sort and Move	1.14	0.73	0.43
Prime Number Sieve	0.66	0.32	0.13
Floating Point Mix	8.30	4.01	2.36
DISK Performance Tests			
BIOS Disk Seek			
*Sequential	1.81	12.01	3.63
*Random	26.75	21.09	19.88
DOS File Access (small records)	73.87	69.77	50.09
DOS File Access (large records)	7.82	6.47	3.74
Video Performance Tests			
Direct Screen Access	2.20	6.53	1.32
Teletype Without Scrolling	0.77	0.66	0.28
Memory Performance Tests			
Conventional Read	1.10	0.33	0.28
Conventional Write	0.72	0.33	0.17

*Speed measured in milliseconds. All other speeds measured in seconds.

Performance Benchmarks

Terry Sanderson
sanders@gpu.utcs.utoronto.ca

Beginning with this issue of *ComputerNews,* UTCS will be using the PC Magazine Labs Benchmarks Release 5.6 in an attempt to display more accurately the performance capabilities of the machines being tested. We will continue to use the Norton Utilities System Information (SI) program to give you a general benchmark figure, and the Core International CoreTest program to benchmark disk performance. However, we felt that we needed to provide you with more detailed performance indicators about specific subsystems on the machines, such as the processor, video, memory, and disk. Hence, the PC Labs' Benchmarks.

We will not publish all the results from the benchmarks; some are just too abstract for the average reader. We will only publish the results of specific tests, which we feel will give you a clearer picture of the performance of the machine. The specific tests are as follows.

Processor Performance Tests

Instruction Mix-8088:
The times given by this benchmark display the general performance of the CPU, memory, and bus architecture using an 8088 instruction mix. Times for this are given in seconds, and smaller times show a higher overall performance.

Instruction Mix-80386:
Same as above except this test also uses some instructions specific to the 80386.

Integer Add:
This test performs a loop with the ADD instruction. Again, smaller times mean higher performance.

Integer Multiply:
As above, except using the IMUL instruction.

String Sort and Move:
A bubble sort with 200 random strings of 16 characters each.

Prime Number Sieve:
This benchmark finds all prime numbers between 0 and 8190.

Floating Point Mix:
This test sets up a mix of floating point calculations in RAM and tests processor speed and RAM access. This test does not use the math coprocessor, but instead uses an emulation library.

Coprocessor Speed Tests

Coprocessor Speed Test:
Tests the speed of the math coprocessor (if installed). This test uses the same calculations as the Floating Point Mix. A smaller number implies higher performance.

Disk Performance Tests

BIOS Disk Seek:
Both sequential and random track-to-track tests show the mechanical speed of the disk head positioner. Times are given in milliseconds, with a smaller number meaning a faster disk.

DOS File Access:
This test result will show the performance of the whole disk subsystem, including disk, controller, and system bus. Both small and large records are tested. Times are measured in seconds.

Video Performance Tests

Direct Screen Access:
Tests the speed of the video subsystem when writes are done directly to memory, bypassing the DOS and BIOS function calls. Times are in seconds.

Teletype w/o Scrolling:
Tests the video subsystem by writing to the screen using BIOS calls. Times are in seconds.

Memory Performance Tests

Conventional Memory:
Reading and Writing to conventional memory (under 640KB). On machines with equal processors and clock speeds, this test will find machines with extra wait states. The results are given in seconds.

The PC Benchmarks program is free. If you would like a copy, call Terry Sanderson at 978-4597. You will have to bring a formatted 3.25-inch or 5.25-inch high-density diskette with you.

Microcomputer Short Courses

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

UTCS offers various noncredit microcomputer courses to faculty, staff, and graduate students of the University of Toronto. These courses cover a number of software programs available for the PC or the Macintosh. Whether you will be typing a thesis on a word processor, or working with spreadsheets, databases, or desktop publishing, we may be able to help you get started.

Our class sizes are small to allow for much individual attention. Continuing support is available upon completion of a course.

The following is a list of the microcomputer courses taught at UTCS:

- Introduction to dBASE IV
- Introduction to Disk Operating System (DOS)
- Electronic Mail Seminar
- Excel on the Macintosh
- Introduction to FoxBASE+/Mac 2.0
- Introduction to HyperCard
- Introduction to Lotus 1-2-3
- Introduction to PageMaker
- ProComm Communications Seminar
- Introduction to SAS on the PC
- Intermediate SAS - Data Processing
- Intermediate SAS - Statistics
- SAS/Graph Seminar
- Microsoft Word on the Macintosh
- Introduction to WordPerfect 5.1
- Advanced WordPerfect 5.1 Topics

To find out about course dates and registration procedures, or to book a place in any of these courses, please contact Irene Rosiecki at 978-4565. Courses are filled on a first-come, first-served basis. The more popular courses fill up quickly, but waiting lists are maintained in case of cancellations.

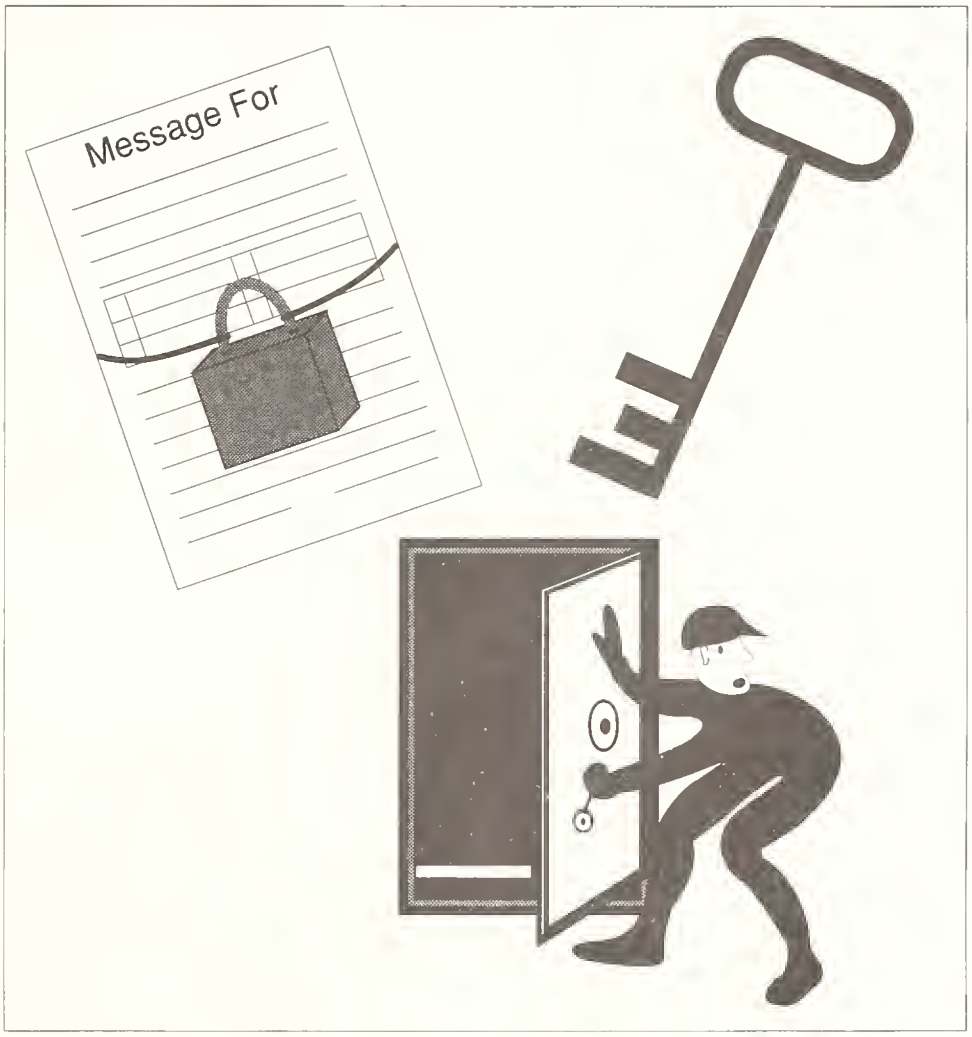
Security and Voice Mail

As reported in a number of articles in newspapers and trade journals, voice mail systems (similar to computer systems) can be prey to the unauthorized and unwanted infiltration of "hackers."

Hackers who succeed in "crashing into" a voice messaging mailbox may do several things. If they get into the system using toll-free access (e.g., through unauthorized use of 800 numbers, stolen credit cards, or fraudulent use of authorization codes), they share mailbox numbers and passwords with acquaintances and/or business contacts. Then they use voice messaging to converse (albeit non-simultaneously) free of charge. Sometimes they send messages to bona fide subscribers asking for their passwords. They might also send childish or irritating messages to mailbox owners.

Hacker activities can be reduced and eliminated by following a few common sense steps. Since uninitialized or unused mailboxes are the primary source of entry for hackers, it is vital that you initialize your mailbox as soon as you have received your voice mail training. In the tutorial, "Jane" will instruct you to change your password. Individual voice mailbox owners should change their passwords on a regular basis.

Passwords on the Aspen system have a minimum of five digits and a maximum of fifteen. When you create your password, you should purposely assign a random number for your mailbox. Do not make the password easy to guess, such as spelling your name or using a date.



The Aspen system allows a caller only three attempts to access a mailbox using incorrect passwords. On the third unsuccessful try, "Jane" politely but firmly disconnects the caller from the system. Whenever a call is terminated for this reason, a "non-service-affecting alarm" is triggered and the mailbox reporting the bad password disconnection will appear on the system administrator's status log. This log is monitored regularly by Ann McLean, Integrated Voice Messaging System (IVMS) Administrator.

For further information on voice mail security or any other IVMS questions, contact Ann McLean at 978-1723.

Debbie Stewart
Voice Communications

Information Security at the University of Toronto

When you mention security, most people assume you are talking about locks, guards or alarm systems, and although physical security is very important, there is more to security than that. In today's Information Age, collection, storage, transmission, and manipulation of data has become key to conducting business efficiently.

Nowadays, most organizations view information as one of the most valuable assets they own. The security of information assets has become a very important function in many organizations and the University of Toronto is no exception.

It is important to keep in mind that when we are talking about security, we are basically talking about protection: protection of valuable assets from intentional or accidental destruction or alteration, as well as unauthorized use or access. Protection of information is also concerned with the confidentiality of information which is owned by the University and is made available to staff and other individuals to enable them to perform their duties efficiently and effectively.

Threats to information can come from within the University as well as from outside sources. Even though most are due to errors and omissions, these threats to the security and integrity of information can have enormous consequences.

Threats can take various forms including unauthorized access and use of data, destruction or alteration of data so as to make it unusable or unreliable, and disclosure of sensitive or confidential information to unauthorized persons both outside and inside the University.

> *...the security of information assets has become a very important function in many organizations and the University of Toronto is no exception.*

When an individual is given access to University resources to perform his/her job or for any other reason, the individual is also given the responsibility to protect those resources and to abide by all security policies and procedures.

There are some very basic things you can do to protect the University's Information Processing resources. The key ones are:

- Keep your password confidential.
- Change your password frequently.
- Do not use obvious, trivial, or predictable passwords.
- Never share your User ID or use someone else's ID.
- Always log off when you are finished using a PC or terminal.
- Make sure you lock away sensitive and confidential information when you are finished using it.
- Do not use illegal or "pirated" software on University PCs.
- Back up your files and store backup copies in a safe and secure place, preferably off-site or in a Data Safe.
- Report security violations immediately.

In conclusion, I would like to leave you with one thought: always remember that the protection of information cannot be effective unless each and every one of us pitches in and does his/her part.

Remember, you are our best security!

Wilfred L. Camilleri
Security Administration, UTSD

Spyglass TRANSFORM Update

Andrzej J. Pindor
apindor@vm.utcs.utoronto.ca

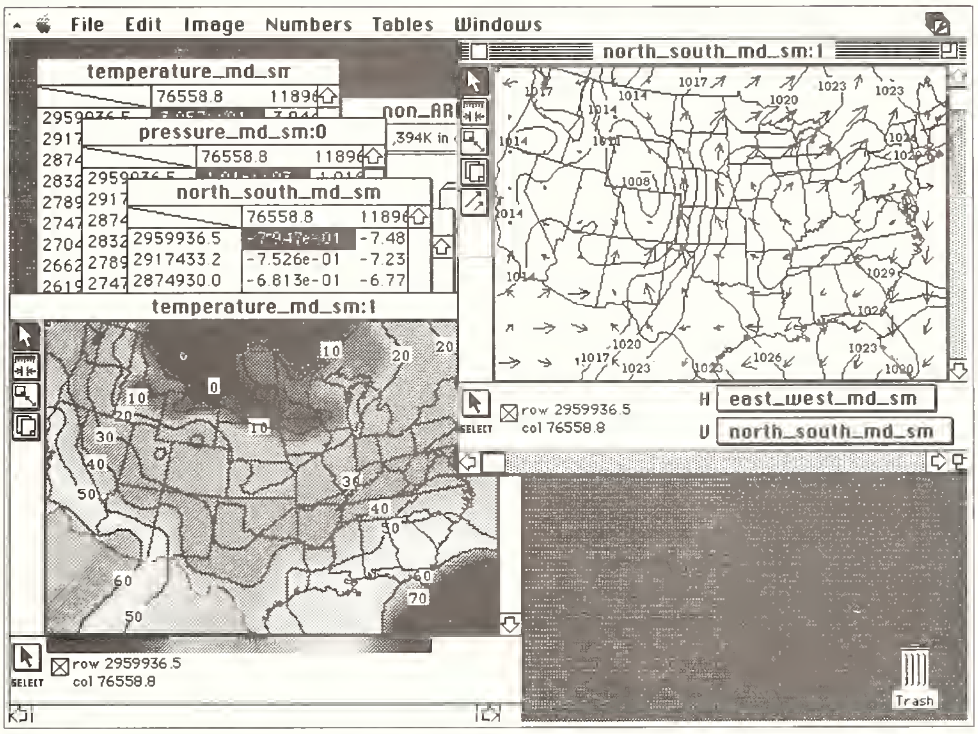


Figure 1: Examples of TRANSFORM plots. In the lower left corner we see constant temperature contour plots overlaid on a map of the United States. In the upper right corner is a vector plot showing wind direction and speed, again overlaid on the map of the United States.

In the January/February issue of *ComputerNews* I reviewed three products from Spyglass Inc.: VIEW, TRANSFORM, and DICER. The company has since released version 2.0 of TRANSFORM, one of their visual data analysis programs for Macintosh computers, and has kindly sent me a copy. This latest version of TRANSFORM is a very powerful product. Its new features include:

- surface plot;
- vector plots;
- missing data handling;
- contour plots;
- overlays;
- better data import;
- additional notebook functions, including Fast Fourier Transforms (FFTs).

Several example data sets, which guide you through a tutorial on the various features of the program, are provided with the software. One of these data sets contains meteorological data from the United States. In *Figure 1* the data are used to illustrate some of the new features of TRANSFORM. In the lower-left corner, constant temperature contours are overlaid on the map. Various temperature values are also illustrated with a difference in shading (onscreen colour coding was used for this purpose, but was converted to grey scale for black-and-white printing). In the upper-right corner, constant pressure contours are overlaid on the map, and wind direction and speed are shown with arrows (this is termed a vector plot). It should be noted that making these overlays is as easy as copying and pasting. Placing labels on contours is also very easy – after clicking on a labelling tool (one of the icons on the left side of both windows) and selecting a font and label size, you click on contours wherever you would like to have labels. Clicking on an existing label removes it should you decide that you would rather have it in another place.

The manual is attractive and clearly written. Both tutorials (*Quick Tour* and *Advanced Tour*) are easy to follow, and effortlessly introduce you to the many sophisticated features of the program.

Those of you who read my earlier review of the Spyglass software will notice that TRANSFORM version 2.0 combines features of the earlier versions of VIEW and TRANSFORM and adds several new ones. The price is only slightly higher, and is a worthwhile expenditure for this interesting product.

Spyglass TRANSFORM is available at UTCS for inspection. If you would like to see how it works so you can judge whether it might be useful in your work, please call Andrzej Pindor at 978-5045 to arrange a demonstration. You are most welcome to bring your own data.

Vendor:
Spyglass Inc.
701 Devonshire Drive, C-17
Champaign, Ill 61820
USA
(217) 355-1665

System Requirements:
Macintosh II series computer equipped with 256 colour capability, 1MB of RAM (4MB recommended for best results), and System software 6.0 or later.
A hard disk is required for effective use of TRANSFORM.
A Floating-point Processing Unit (FPU) is recommended.

Pricing:
US$249 (academic price)

Chaos Again:

A New Version of the Dynamics Program

Andrzej J. Pindor
apindor@vm.utcs.utoronto.ca

In the March issue of *ComputerNews* I reviewed “Dynamics.” This program for analyzing systems characterized by chaotic behaviour was created by Professor James Yorke of the University of Maryland. At the time, I reported that it is an effective research tool for the analysis of dynamical systems, but that no effort had been made to make it “flashy” and user-friendly.

I have just learned that a new version of this program, one with an improved (more user-friendly) interface, will be released soon. There is also a possibility of purchasing an inexpensive site license for approximately US$20 or less per user. Before we acquire this license I would like to hear from people who might be interested in purchasing the program. If you are interested in a site license for “Dynamics,” please call me at 978-5045 or send e-mail to *apindor@vm.utcs.utoronto.ca* or *pindor@gpu.utcs.utoronto.ca.*

Reminder of Site License Renewals

Patricia Hood
phood@vm.utcs.utoronto.ca

The following site licenses expired June 30, 1991:

SAS/PC and SAS/PC network, plus modules;
SAS/UNIX, plus modules;
SYSTAT 3.2, 5.0, 5.1;
WATFOR-77, -87, and GKS module.

Renewal contracts and information letters have been mailed to all current customers.

To ensure continued use of these software packages, return your completed 1991/92 contract and payment as soon as possible.

If you have questions about the renewal process or if you have not received your renewal information package, please contact Evelyn Ward of the UTCS Information Office at 978-4990.

Free Electronic Mail Demonstration

Anyone interested in sending documents to colleagues or friends reliably, quickly, and inexpensively will not want to miss this demonstration. We will introduce you to the NetNorth/BITNET/EARN communications network, which is accessible from the CMS system. This network connects more than a thousand universities and research institutes in Europe, Asia, and North America. Sending documents or files over the network is very easy to learn.

We will show you how to send mail and files to another institution, and how to talk directly to someone on the network. ***Please note this is a demonstration only.***

Space is limited. If you would like to attend this demonstration, please contact Irene Rosiecki at 978-4565 to reserve a place.

ProComm Communications Program Seminar

ProComm is a general purpose communications program currently available to all U of T faculty, staff, and students. It is suitable for connecting to the many networks on campus.

A seminar has been scheduled to introduce ProComm and its various features: terminal emulation (a number of popular ones will be reviewed); the dialing directory; file transfer protocols, such as Kermit and XMODEM; configuration and modem parameter settings; and the DOS gateway, which allows you to execute DOS commands and other programs while you are still in ProComm.

There is a fee for this seminar. To reserve a place, please contact Irene Rosiecki at 978-4565.

UTCS Services

Facilities Managed by UTCS

Administrative Computing
- administrative IMS, DB2, Batch, and TS0
- 3081K processor, 48 megabytes of memory
- MVS/XA operating system

Computer Disciplines Facility/UNIX
SUN 3/280s, 16 megabytes of memory (zero.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

SUN 3/280s, 16 megabytes of memory (one.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

Computer Disciplines Facility/PC
- 88 NEC computers connected in a Local Area Network:
  •Robarts Library (Rm. 1061A): 36 NEC PCs
  •St. Michael's College (Rm. 107): 26 NEC PCs
  •Sidney Smith (Rm. 1071): 23 NEC PCs
  •Trinity College (Rm. 024): 3 NEC PCs
- MS-DOS with Turing environment
- introductory computer science

Computers in Quantitative and Empirical Science Teaching (CQUEST)
- 52 DEC VT1000 X Window terminals, 20 DEC 2100 workstations connected in Local Area Network:
  •Ramsay Wright (Rm. 211, 213): 29 DEC VT1000s, 10 DEC 2100s
  •Sidney Smith (Rm. 2105): 20 DEC VT1000s, 10 DEC 2100s
  •Departmental use: 3 DEC VT1000s

Public Sites
- 50 XT100 terminals connected to PACX
  •Robarts Library (Rm. 1061A): 24 terminals
  •Engineering Annex (Rm. 107B): 12 terminals
  •St. Michael's College (Rm. 107): 9 terminals
  •Victoria College (1st floor): 3 terminals
  •Trinity College (Rm. 024): 2 terminals

Erindale College Systems
SUN 3/280, 16 megabytes of memory
- instructional and research access using UNIX

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

Institutional Relations System
VAX-11/750, 8 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility
- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Ontario Centre for Large Scale Computation (OCLSC)
- Cray Research Inc. X-MP/28
- 2 processors, 8 megawords main memory
- solid state disk (SSD) with 64 megawords of storage
- UNICOS 5.1.11 operating system
- VAX 8350, MicroVAX-II, VAXstation 3200, and SUN-3/280 provide front-end services

> *The mandate of UTCS is to encourage and support the use of information technologies across campus, and to plan, implement, and operate common-carrier networks and certain appropriate central computer facilities.*

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS
Technical Assistance: 978-6602
- General Purpose Timesharing environment
- Hub of the NetNorth network with access to BITNET, EARN and the Internet
- 4381-R03 processor with 32 megabytes of memory
- CP operating system, VM/SP HPO R5
- CMS timesharing system, VM/SP Release 5
- FTP and TELNET access to the campus ethernet, as well as Internet
- RSCS spooling system, Release 2.3

GP UNIX
Technical Assistance: 978-8853
- General Purpose Timesharing under SUN UNIX 4.1.1
- SUN 4/490, 32 megabytes of memory
- access to Linotronic typesetter
- full access to USENET, an electronic technical information exchange facility
- full access to the Internet, UUCPNET, BITNET, CDNNET

Services

Communications, Networking & Technical Support
Primary Phone: 978-7087
- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs and Macintoshes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS, and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; CA*net, the Canadian National Network; and USENET, the UNIX networking fraternity
- provides gateway to the US Internet
- will provide a communications solution to department needs on a contractual basis

Information Centre
Primary Phone: 978-HELP
- Provides assistance in use of electronic messaging, including use of Local Area Networks (LANS); NetNorth/BITNET/EARN, the world Universities network; CDNNET, the Canadian X.400 network; ARPANET; CSNET; USENET; and other international connections.
- provides advising, consulting and, in some cases, documentation on:
  - command languages of CMS and UNIX
  - packages and libraries, including SAS, SPSS, BMDP, IMSL, and NAg
  - editors and formatters, including XEDIT, ed, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - CD-ROM access to software and information discs
  - offers PostScript laser printing
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for Education Facility
  - administers Macintosh Education Facility
- high-quality typesetting
- provide image and typed text scanning
- installs and maintains application packages
- administers site licenses for various software packages
- provides short courses and seminars on the more popular services and software packages

Telephone Listings

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	BC214	978-7109
External Marketing Consultant	Ihor Prociuk	BC217	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Information Office	Evelyn Ward	BC201	978-4990
Account & Access Code Enquiries	Phillip Mun	BC101B	978-7148
IBM & Macintosh Maintenance	Kam Mark	BC103	978-5050
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Communication, Networking & Hardware	Rosi Derka-Tseu	BC105	978-7087
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
Network Operations Centre	978-4621
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-3959
Interactive Services 1200 (bps)	978-3959
Interactive Services 2400 (bps)	978-7239
Interactive Services 9600 (bps)	978-7220

UTCS Directory

Director:	Dr. Warren Jackson	BC118	978-8948	wcj@vm.utcs.utoronto.ca
Associate Director:	Eugene Siciunas	BC116	978-5058	eugene@vm.utcs.utoronto.ca
Managers:				
Communications & Technical Support	Norman Housley	BC121B	978-4967	norman@vm.utcs.utoronto.ca
Information Centre	Don Gibson	BC217	978-7331	don@vm.utcs.utoronto.ca
Internal Systems Support	Ron Vander Kraats	BC121A	978-4428	rvk@vm.utcs.utoronto.ca
Operations Support	Dr. Bob Chambers	MP350	978-7092	
Systems Support	Bill Lauriston	MP331	978-3579	bill@vm.utcs.utoronto.ca

Committees on Computing

Supercomputer Users' Group at U of T	Chair	Prof. W.R. Peltier	978-2938
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986

Legend:
BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

Terminal & Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA, CDF), 11 King's College Road, Rooms 107, 107B, 201
Erindale College (Erin), 828-5339, 3359 Mississauga Road North, Erindale Campus, Rooms 2037, 2039A-B-C, 2045
Ramsay Wright, 25 Harbord St., Rooms 211, 213
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Room 1071, 2105
St.Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskin Ave., Room 024
Victoria University, 73 Queen's Park Cres., 1st floor

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2039)Δ	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045-46-47)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235)†	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Ramsay Wright	7:00-21:00	7:00-18:00	closed	closed	Undergrads	No
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Trinity	8:00-23:00	8:00-23:00	closed	closed	None	978-HELP for Research
Victoria	8:30-21:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 10:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Legend

* Research includes graduates, faculty, staff.
Δ Key access available.
† Access restricted to building hours.

Computer and Printer Access

Sites	PACX	CDF/PC	CQUEST	Printers
CDF				Y
EA	Y			Y*
Erin	Y			Y*
Ramsay Wright			Y	Y**
Robarts	Y	Y		Y*
Sidney		Y	Y	Y**
St.Michael's	Y	Y		Y*
Trinity	Y	Y		
Victoria	Y			

(Y=yes, N=no)
*** Public Printers** ****Site Only**

UTCS Site Licenses

UTCS administers a number of software site licenses available to the University of Toronto community. (Usually, this means faculty, staff, and graduate students, though some licenses apply to undergraduate students also. See "Restrictions" in the table below.) The licenses provide a variety of software at much-reduced cost. The majority of the licenses must be renewed each year. Most are terminated when you leave U of T.

Each license has a contract that you must complete. It outlines your responsibilities and any limitations in the use of the software. Except for ProComm, the contracts and software are available from the UTCS Information Office, 4 Bancroft Avenue, Room 201. ProComm is available from the UTCS Advising Office, 978-HELP. To qualify as a member of the U of T community, you must provide a valid Employee number or Student number.

The table below describes the available site licenses. The Restrictions column specifies who may purchase the license. If the restriction is Research, the payment must come from research money. The Diskettes column describes how you actually receive the software. Large packages, like SAS and SPSS, require that you borrow the diskettes, install the software, and return the diskettes. Smaller packages, consisting of up to five diskettes, either require you to bring your own diskettes or include the cost of the UTCS-supplied diskettes in the license fee.

For more detailed information about these site licenses, telephone the UTCS Information Office at 978-4990.

Site Licenses at UTCS

Product Name	***Chaos in the Classroom I: Maps and Bifurcations***	***ProComm***	***QuickMail***
System	PC;	PC; Communications	Mac; Electronic mail
Restrictions	Faculty, Staff, Graduate Students	Faculty, Staff, Graduate Students, Undergraduate	Faculty, Staff
Cost	$12	Free	$35 per user Upgrades: $17
License Period	One-time fee	N/A	One-time fee
Diskettes	One 5.25" or one 3.5"; bring own	Two 5.25"; bring own	One 3.5"; bring own
Documentation Available at UTCS	Yes	On disk; part of package	No
Product Name	***SAS/PC***	***SAS/PC network***	***SAS/UNIX (SUN 3)***
System	PC; Statistical analysis	PC; Statistical analysis	UNIX; Statistical analysis
Restrictions	Faculty, Staff, Graduate Students, Undergraduate	Faculty, Staff, Graduate Students	Faculty, Staff, Graduate Students
Cost	BASE/STAT/GRAPH/FSP: $35; IML module: $22; ETS module: $35.	$17 per station	$198 BASE/STAT/GRAPH; $70 ea. FSP, IML modules
License Period	July 1-June 30	July 1-June 30	July 1-June 30
Diskettes	Deposit per binder Maximum $350	Deposit per binder Maximum $350	Tape cartridge
Documentation Available at UTCS	Yes	Yes	Yes

Site Licenses at UTCS *cont.*

Product Name	*SAS/UNIX (SUN 4 and HP 8)*	*SPSS/PC*	*SYSTAT*
System	UNIX; Statistical analysis	PC; Statistical analysis	Mac; Statistical analysis
Restrictions	Faculty, Staff, Graduate Students	Research	Faculty, Staff, Graduate Students
Cost	$264 BASE/STAT/GRAPH; $92 ea. FSP, IML modules	$100	$58
License Period	July 1-June 30	Nov 1-Oct 31	July 1-June 30
Diskettes	Tape cartridge	Deposit $25 per box; 2-3 boxes	Five 800KB 3.5" diskettes; bring own
Documentation Available at UTCS	Yes	No	Yes
Product Name	*WATFOR-77*	*WordPerfect*	
System	PC; FORTRAN compiler	PC; Word Processing	
Restrictions	Research	Faculty, Staff	
Cost	$35 [$35 WATFOR-87 (math co-processor)]; Add $5 GKS (Graphics Kernal System)	New: $42 Upgrade: $15	
License Period	July 1-June 30	One time fee	
Diskettes	Two-three 5.25" diskettes; bring own	Deposit $25 per box; 1 box	
Documentation Available at UTCS	Yes	Yes	

PC Maintenance

Below is a listing of microcomputer equipment which UTCS Field Service covers under yearly maintenance contracts. All contracts are based on a minimum 12 month period. Service calls are handled on a first-come, first-served basis. Average response time is four hours. Equipment must be certified as operational prior to commencement of a maintenance contract. (There is no extra charge for this service.) Please contact UTCS Field Service at 978-5050 or 978-6486 to obtain service and pricing information.

IBM PC or Compatible Equipment

Systems
IBM PC or Compatible
IBM PC/XT or Compatible
IBM PC/AT or Compatible
IBM PS/2 - Model 25
IBM PS/2 - Model 30
IBM PS/2 - Model 50

Disk Drives
360KB & 1.2MB 5.25-inch Floppy
720KB & 1.4MB 3.5-inch Floppy

Hard Disk Drives
20,30,40,60 & 80 Megabyte

Displays
Monochrome
CGA / EGA / VGA Colour
PS/2 Monochrome
PS/2 Colour Display

Modems
1200 & 2400 baud

Laser Printers
HP LaserJet
HP LaserJet II
PS Jet +
QMS PS 800
QMS PS 800+
QMS 810

Dot Matrix Printers
C-ITOH F10-40 & F10-55
Epson RX80, FX80 & FX100
Epson LQ800, LQ1000, LQ1500
IBM Proprinter & Proprinter XL
NEC 3550, P5 & P6
Panasonic KX-P1091 & KX-P1092
Roland PR-1012
Toshiba P340, P341, P350 & P1351

Apple Macintosh Equipment

Systems
Mac 128, 512, Plus
Mac Classic - All Models
Mac LC - All Models
Mac SE - All Models
Mac SE/30 - All Models
Mac II, IIx, IIcx, IIci, IIsi, IIfx

Disk Drives
400KB, 800KB 3.5-inch Floppy
1.4MB 3.5-inch Floppy

Hard Disk Drives
20,30,40,60 & 80 Megabyte

Displays
Apple Mac 12-inch Monochrome
Apple Mac 12-inch RGB
Apple High-Res 12-inch Monochrome
Apple High-Res 13-inch Colour

Modems
1200 & 2400 baud

Laser Printers
Personal LaserWriter LS
Personal LaserWriter NT
LaserWriter
LaserWriter Plus
LaserWriter IINT
LaserWriter IINTX

Dot Matrix Printers
ImageWriter I
ImageWriter II
ImageWriter II/L
Apple StyleWriter

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